"A STUDY ON FACTORS INFLUENCING THE SUCCESS OF THROMBOLYSIS BY STREPTOKINASE IN ACS - STEMI PATIENTS IN CMCH GENERAL MEDICINE DEPARTMENT"

Dissertation Submitted to

THE TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY

In partial fulfilment of the regulations
for the award of the degree of

M.D. BRANCH – I
GENERAL MEDICINE

CHENGALPATTU MEDICAL COLLEGE
THE TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY
TAMILNADU, INDIA

APRIL 2016

CERTIFICATE

This is to certify that **Dr.P.V.Karthik**, postgraduate student (2013-2016) in the department of General medicine , Chengalpattu Medical College and Hospital has done this dissertation titled **"A STUDY ON FACTORS INFLUENCING THE SUCCESS OF THROMBOLYSIS BY STREPTOKINASE IN ACS - STEMI PATIENTS IN CMCH GENERAL MEDICINE DEPARTMENT",** under the direct guidance and supervision of guide Prof .DR.R.NARMADHA LAKSHMI.M.D., in partial fulfilment of the regulations laid down by the **Tamilnadu Dr.M.G.R. Medical University**, Chennai, for M.D., General Medicine Degree Examination.

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DECLARATION

I , Dr.P.V.Karthik , hereby declare that this dissertation titled **"A STUDY ON FACTORS INFLUENCING THE SUCCESS OF THROMBOLYSIS BY STREPTOKINASE IN ACS - STEMI PATIENTS IN CMCH GENERAL MEDICINE DEPARTMENT"** is a bonafide work done by me at Chengalpattu Medical College during 2013-2016 under the direct guidance and supervision of **Prof. DR.R.NARMADHA LAKSHMI .M.D.,** Department of General Medicine, Chengalpattu Medical College and Hospital , Chengalpattu . The dissertation is submitted to the Dr. M.G.R. Medical University in partial fulfilment of the University regulations for the award of MD degree in General Medicine Examination to be held in April 2016.

Place: Chengalpattu

Date:

(**Dr.P.V.Karthik)**

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Prof. Dr.K.MUTHURAJ .M.S.

DEAN

CHENGALAPTTU MEDICAL COLLEGE AND HOSPITAL,

CHENGALPATTU.

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I bow my head in respect before God Almighty

Date: **Signature of the candidate**

Place: **Name : Dr.P.V.Karthik**

INSTITUTIONAL ETHICS COMMITTEE

CHENGALPATTU MEDICAL COLLEGE , CHENGALPATTU

APPROVAL OF ETHICAL COMMITTEE

To

Dr.P.V.Karthik,
MD General Medicine
(2nd Year)
Chengalpattu Medical College,
Chengalpattu..

Dear Dr.

The Institutional Ethical Committee of Chengalpattu Medical College reviewed and discussed your application to conduct the clinical / dissertation work entitled

A STUDY OF FACTORS INFLUENCING THE SUCCESS OF THROMBOLYSIS BY STREPTOKINASE IN ACS -STEMI PATIENTS IN CMCH GENERAL MEDICINE DEPARTMENT".

ON 11.06.2014

The following documents reviewed

1. Trial protocol, dated _____version no
2. Patient information sheet and informed consent form in English and / or
   vernacular language.
3. Investigators Brochure, dated _____version
4. Principal Investigators current CV
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The following members of the Ethics committee were present at the meeting held on

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2. Dr.C.Srinivasan MD.,
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Biological Scientist

3. Dr.K.Baskaran MD.,
   Asso Prof of Pharmacology, CHMC

Non Clinical Member

4. Dr.P.Parasakthi MD
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6. Philosopher : Mr.K.S.Ramprasad

7. Lawyer : Lr. I. M. Karimala Basha

8. Layperson : Mr.Dilli

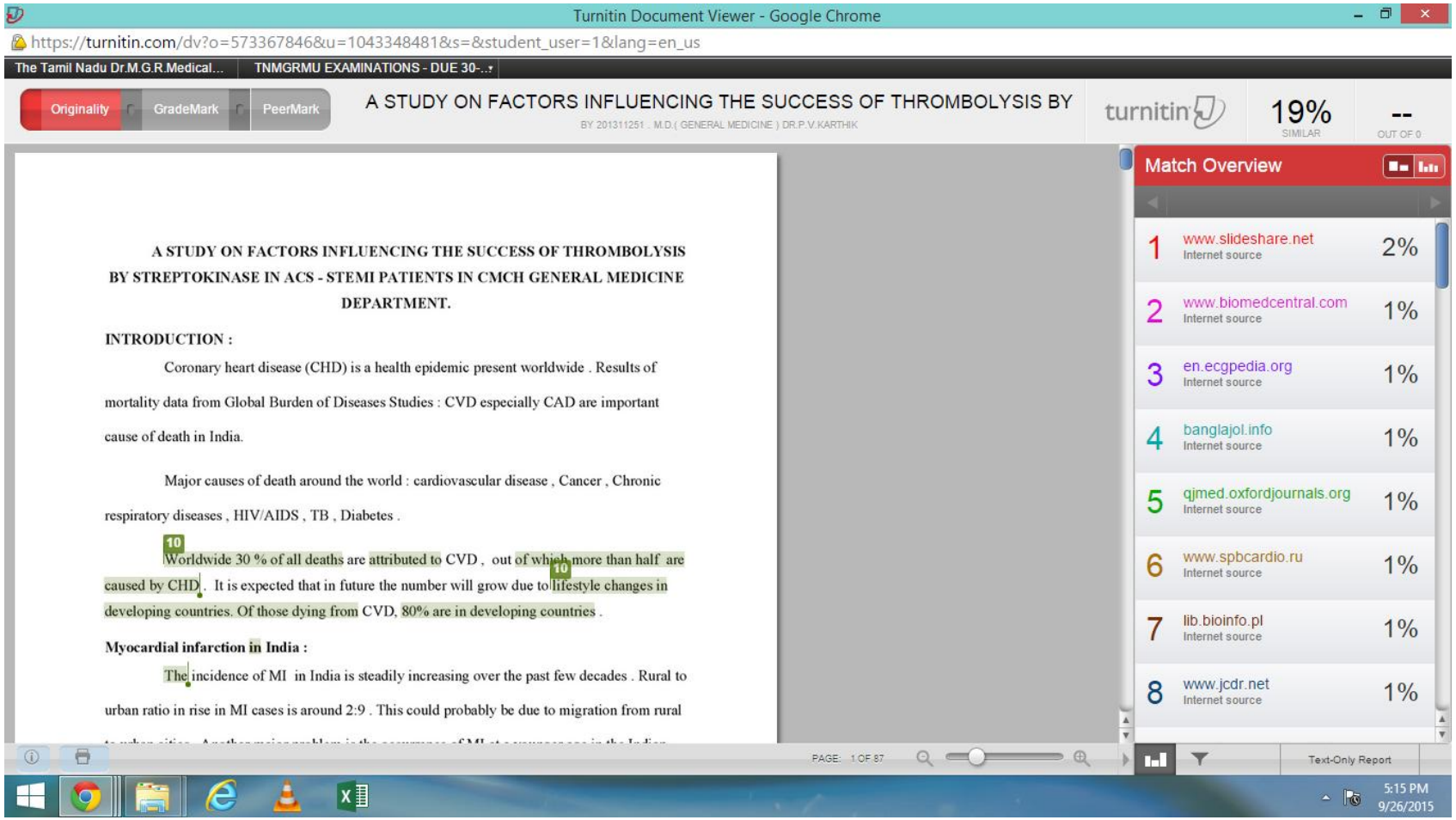
We approve the clinical trial to be conducted in its presented form

The Institutional Ethics Committee expects to be informed about the progress of the study and any SAE occurring in the course of the study, any changes in protocol and patient information / informed consent and asks to provide copy of final report.

Yours sincerely

11/6/14

Member secretary, Ethics Committee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INTRODUCTION :
Coronary heart disease (CHD) is a health epidemic present worldwide . Results of mortality data from Global Burden of Diseases Studies : CVD especially CAD are important cause of death in India.
Major causes of death around the world : cardiovascular disease , Cancer , Chronic respiratory diseases , HIV/AIDS , TB , Diabetes .
Worldwide 30 % of all deaths are attributed to CVD , out of which more than half are caused by CHD . It is expected that in future the number will grow due to lifestyle changes in developing countries. Of those dying from CVD, 80% are in developing countries .
Myocardial infarction in India :
The incidence of MI in India is steadily increasing over the past few decades . Rural to urban ratio in rise in MI cases is around 2:9 . This could probably be due to migration from rural
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LIST OF CHARTS

LIST OF ABBREVIATIONS

CHD	Coronary Heart Disease
CVD	Coronary Vascular Disease
CAD	Coronary Artery Disease
ECG	Electro Cardio Gram
DM	Diabetes Mellitus
FBS	Fasting Blood Sugar
PPBS	Post Prandial Blood Sugar
SHT	Systemic Hypertension
LMCA	Left Main Coronary Artery
LAD	Left Anterior Descending Artery
LCX	Left Circumflex Artery
RCA	Right Coronary Artery
TVD	Triple Vessel Disease
STEMI	ST – Elevation Myocardial Infarction
NTEMI	Non – ST – Elevation Myocardial Infarction
UA	Unstable Angina
TB	Tuberculosis

HIV	Human Immunodeficiency Virus
AMI	Acute Myocardial Infarction
AWMI	Anterior Wall Myocardial Infarction
IWMI	Inferior Wall Myocardial Infarction

PROFORMA

PATIENT DETAILS :

NAME	
AGE	
SEX	

DATE,MONTH,YEAR OF ADMISSION	
WARD NO	
IP NO	

HISTORY :

COMPLAINT OF	
SYMPTOM ONSET TO NEEDLE TIME	

PAST HISTORY / TREATMENT HISTORY :

DIABETIS MELLITUS	
SYSTEMIC HYPERTENSION	
H/O CVA	

PERSONAL HISTORY :

SMOKING	

INVESTIGATIONS

ECG (AWMI / IWMI)	
BP , PULSE RATE	
FBS / PPBS	

KEY TO MASTER CHART:

M	**Male**
F	**Female**
NS	**Non-sedentary**
S	**Sedentary**
AWMI	**Anterior wall myocardial infarction**
IWMI	**Inferior wall myocardial infarction**
LWMI	**Lateral wall myocardial infarction**
TVD	**Triple vessel disease**
LAD	**Left anterior descending artery**
RCA	**Right coronary artery**
LCX	**Left circumflex artery**
S1	**First septal branch of LAD**
D1	**First diagonal branch of LAD**
KC	**Killip classification**

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Worldwide 30 % of all deaths are attributed to CVD, out of which more than half are caused by CHD. It is expected that in future the number will grow due to lifestyle changes in developing countries. Of those dying from CVD, 80% are in developing countries .

Myocardial infarction in India:

The incidence of MI in India is steadily increasing over the past few decades. Rural to urban ratio in rise in MI cases is around 2:9. This could probably be due to migration from rural to urban cities. Another major problem is the occurrence of MI at a younger age in the Indian population.

STEMI is an emergency due to acute total occlusion of an epicardial coronary artery , most often due to atherosclerotic plaque rupture / erosion and subsequent thrombus formation. Compared to UA / NSTEMI, STEMI is associated with a higher in -hospital and 30 day morbidity and mortality. Left untreated, the mortality rate of STEMI can exceed 30% and the presence of mechanical complications (papillary muscle rupture, ventricular septal defect, and free wall rupture) increases the mortality rate to 90% .

Keys to treatment of STEMI include rapid recognition and diagnosis, co ordinated mobilization of health care resources, and prompt reperfusion therapy. Mortality is directly related to total ischaemia time.

Thrombolysis by fibrinolytic agents is still the preferred mode of treatment in India . Only 15% to 20% of patients with MI are able to undergo primary PCI, available in only a few tertiary hospitals in the city limits. Several factors contribute to success of re perfusion in a case of STEMI – age, sex, time taken from onset of pain to treatment, co morbidities like diabetes and systemic hypertension, lifestyle changes like smoking, whether AWMI OR IWMI ,etc. So, in the following study, the influence of each of these factors on the success of thrombolysis by Inj.Streptokinase in STEMI patients have been analysed and correlated with the data obtained from subjects from similar studies.

AIM OF THE STUDY

1. TO STUDY THE VARIOUS MODIFIABLE AND NON-MODIFIABLE FACTORS INFLUENCING THE SUCCESS OF THROMBOLYSIS IN ACS – STEMI PATIENTS
2. COMPARING THE STUDY WITH SIMILAR STUDIES CONDUCTED BEFORE IN FAMOUS INSTITUTIONS

REVIEW OF LITERATURE

ACUTE CORONARY SYNDROME:

Acute coronary syndrome (ACS) is a term for the common end result, acute myocardial ischemia. It includes STEMI, NSTEMI and Unstable Angina.

ANATOMY OF CORONARY ARTERIES:

The coronary arteries arise from the coronary sinuses and supply the myocardium.

There are two coronary arteries, a left coronary and a right coronary. They arise from the left and right aortic sinuses respectively.

LEFT MAIN CORONARY ARTERY:

The left coronary artery divides into the left circumflex artery (LCX), which passes over the left atrio-ventricular groove, and the left anterior descending artery (LAD), which courses towards the apex in the anterior inter-ventricular groove.

Branches of Left coronary artery :

1. Left anterior descending artery –

It can be divided into proximal, mid and distal segments and this helps to differentiate the names of its various small branches:

Branches:

- Septal perforators: course to the right towards the septum, Named as S1, S2 etc
- Diagonal branches: course to the left on the anterolateral wall of the left ventricle. Named as D1, D2 etc..

Segments:

- Proximal: from the origin the first diagonal branch (D1) (although some authors use the first septal perforator (S1) as the landmark)
- Mid: from the origin of D1 to half the distance from the D1 origin to the apex.
- Distal: distal to half the distance from the D1 origin to the apex.

Relations:

The LAD lies in the epicardial fat within the anterior inter-ventricular septum [1]:

- Inferior: myocardium
- Superior: pericardium

Supply:

It supplies the anterolateral myocardium and apex with one of its branches supplying the anterior two-thirds of the inter- ventricular septum.

Variant anatomy:

- dual left anterior descending coronary artery [2]: two left anterior descending coronary arteries (one usually shorter in length) that are both situated in the anterior inter-ventricular groove.

- It is important to know of this variation when planning surgical vascularisation[3]

Circumflex artery:

The artery travels in the left atrio-ventricular groove between the left ventricle and left atrium. The artery is located in the epicardium.

The circumflex artery gives off up to three obtuse marginal branches and may give off a left postero-lateral branch and may supply the inferior inter-ventricular artery.

Supply - Branches of the circumflex artery supply the lateral and postero-lateral walls of the left ventricle.

Variant anatomy:

- In a left-dominant circulation, the circumflex artery supplies the inferior inter-ventricular artery instead of the right coronary artery. (RCA)
- In a co-dominant circulation, both the circumflex artery and RCA supply the inferior inter-ventricular artery (or a duplicated inferior inter-ventricular artery)
- The RCA supplying the inferior inter-ventricular artery and the circumflex artery supplying a large left postero-lateral branch has also been considered co-dominant
- The circumflex artery may arise separately off the left coronary cusp from the LAD (i.e. no left main coronary artery) the circumflex artery may have an aberrant origin off the right coronary cusp.

Ramus intermedius:

The ramus intermedius results from trifurcation of the LMCA. It is present in 15% - 30% of the population.

It can have a course similar to the obtuse marginal branches of the LCX artery or the diagonal branches of the LAD artery and thus can supply either the anterior or medial aspect of the heart.

In practice, even if there is not a true trifurcation, some cardiologists may term a prominent early branching (high origin) obtuse marginal artery, a

ramus branch if it supplies the territory of small diagonal branches since there is an inverse relationship between the size of the ramus intermedius and the size and distribution of the diagonal branches.

RIGHT CORONARY ARTERY:

The right coronary artery (RCA) is one of the two main coronary arteries.

Origin:

The RCA originates from the right coronary sinus .

Course:

The RCA passes to the right in the right atrio-ventricular groove, along the anterior to inferior surface of the heart.

- In people with **right dominant** circulation (seen in the majority of people), the RCA passes anteriorly to become the inf inter-ventricular artery

- In people with **left dominant** circulation the RCA peters out usually as an acute marginal artery and the inferior inter-ventricular artery usually arises from the left circumflex artery.

Branches:

- Conus artery (in 60%)
- Sinus artery (60%)
- Acute marginal arteries (designated AM1, 2, etc)
- Atrio-venticular nodal artery
- Terminal branches (in right dominant circulation)
- Inferior inter-ventricular artery also known as the posterior descending artery.
- Posterior left ventricular branch (PLV or PLB)
- In left dominant hearts, the RCA usually peters out as an acute marginal branch

Supply:

- Conus artery: pulmonary outflow tract
- Sinus artery: sinoatrial (SA) node
- Acute marginal arteries: anterior wall of the right ventricle
- Atrio-ventricular nodal artery: atrio-venticular (SA) node
- Terminal branches (in right dominant circulation)
- PDA: inferior wall of the right ventricle and the inferior 1/3 of the inter-ventricular septum (the latter defining coronary dominance).
- PLV: inferior wall of the left ventricle

Variant Anatomy:

A. Variations in origin

- From the aorta at or above the sino-tubular junction
- From the left coronary sinus or LCA where the proximal RCA takes a 'malignant' inter-arterial course in which the vessel is prone to extrinsic compression
- In up to 50% of cases there are separate ostia for the RCA and conus artery from the sinus or aorta

B. Variations in branching

- PDA and PLV as terminal branches
- PDA as the only terminal branch (in which the PLV is supplied by the LCx)
- Terminates as an acute marginal branch (in left dominant circulations)

C. Variations in course

- Intra-atrial course
- Inter-arterial course

INFERIOR INTERVENTRICULAR ARTERY:

The inferior inter-ventricular artery is an artery that extends along the inferior inter-ventricular sulcus. The artery supplies the posterior third of the inter-ventricular septum through posterior septal perforating arteries.

The inferior inter-ventricular artery can anastomose with the anterior inter-ventricular artery, a branch of the LAD. It can also anastomose with the LAD through each vessel's respective septal perforators.

The vessel that supplies this artery establishes the coronary artery dominance of the heart. In a right-dominant system (89.1%), the right circumflex artery supplies it. In a left-dominant system (8.4%), the left circumflex supplies it.

DEFINITIONS:

UNSTABLE ANGINA:

Unstable angina is usually due to reduced blood supply to myocardium due to coronary artery athero-thrombosis but it does not result in any myocardial necrosis.

STEMI:

Two of the following three criteria should be present as per the Classic WHO criteria for acute MI : (1) a history indicative of coronary ischemia for atleast more than 30 minutes (2) evolutionary changes on serial ECGs indicative of myocardial infarction, and (3) a rise and fall in serum cardiac

markers suggestive of necrosis of myocardium. Only two of the three criteria are needed for diagnosis .

NSTEMI:

If the patient did not have ST elevation or Q waves in ECG, and the cardiac enzymes are elevated, the patient was diagnosed as having NSTEMI.

MYOCARDIAL INFARCTION - STEMI:

The 30-day mortality rate from myocardial infarction is 30%, with more deaths occurring before arrival of patient to a hospital Approximately 1 out of 25 patients who survives the initial period dies in the first year after myocardial infarction.

PATHOPHYSIOLOGY:

STEMI usually occurs when coronary blood flow decreases all of a sudden following a thrombotic occlusion of a coronary artery which was previously affected by atherosclerosis. In most cases, STEMI occurs when the surface of an atherosclerotic plaque becomes disrupted and conditions favor thrombogenesis and a thrombus develops at the site of vessel injury.

PLAQUES:

The atherosclerotic plaques of STEMI patients are composed of fibrous tissue of varying density with overlying thrombus. Coronary arterial thrombi responsible for STEMI are usually 1cm in length; stick to the luminal surface of an artery; and contain platelets, fibrin, erythrocytes ,and leukocytes.

PLAQUE DISRUPTION:

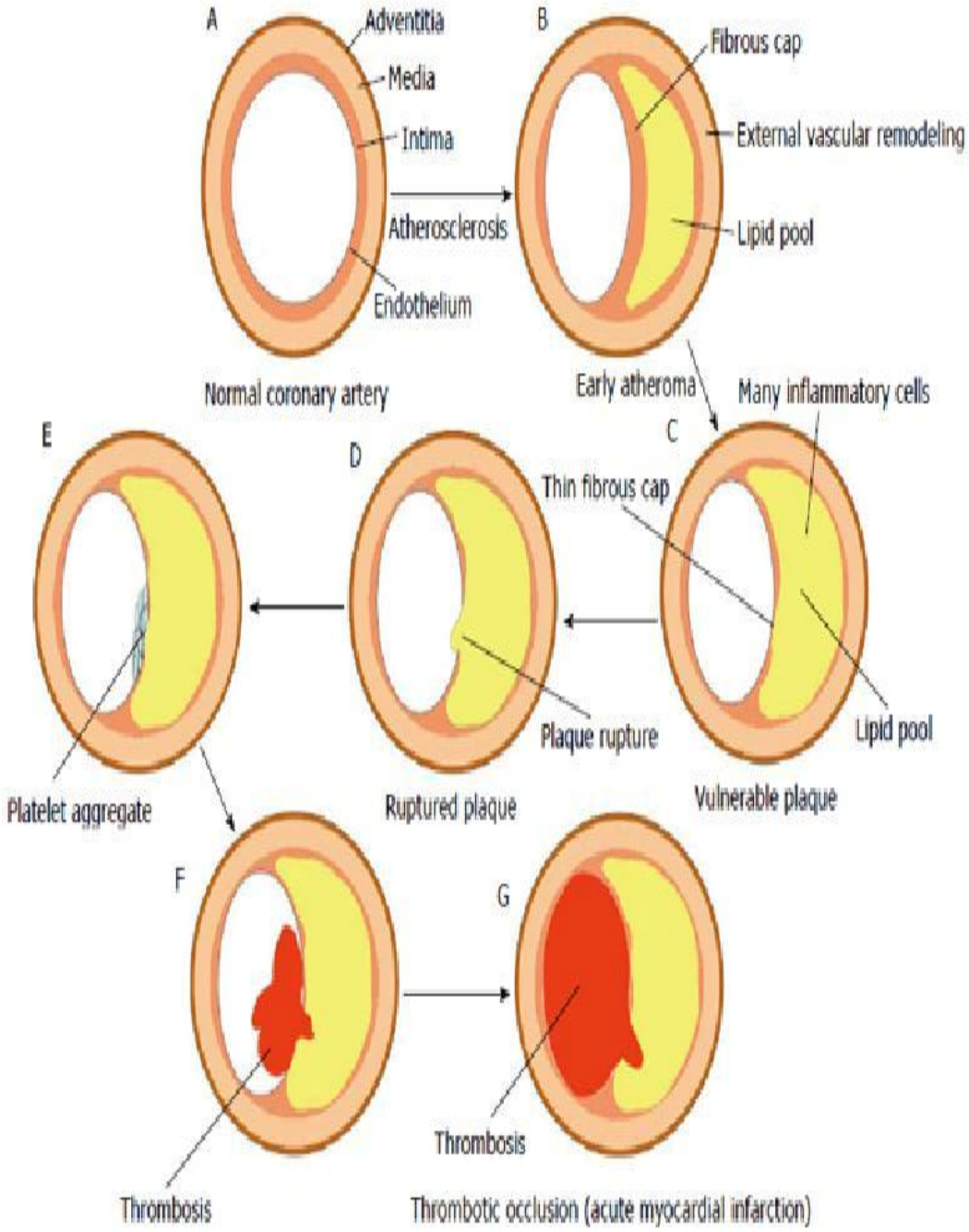
Atherosclerotic plaques which are prone to disruption express metalloproteinase enzymes in increased amounts which in turn degrade components of the protective extracellular matrix.

Caused by:

1. Activated macrophages and mast cells
2. Stresses caused by intraluminal pressure, increased tone of coronary arteries, increased heart rate and disruption of nutrient vessels.

Plaque disruption occurs followed by exposure of thrombogenic substances and the coronary artery lumen is obstructed by platelet aggregates, fibrin, and RBCs. They in turn produce an extensive thrombus filling a large segment of the coronary artery.

Disruption of plaques is now considered to underlie most acute coronary syndromes. Complete occlusive thrombi results in a large zone of necrosis involving nearly full thickness of the ventricular wall and typically produce ST elevation on the ECG.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Atherosclerosis
B
Fibrous cap
External vascular remodeling
Lipid pool
Early atheroma
C
Many inflammatory cells
Thin fibrous cap
Lipid pool
Vulnerable plaque
D
Plaque rupture
Ruptured plaque
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Platelet aggregate
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Thrombosis
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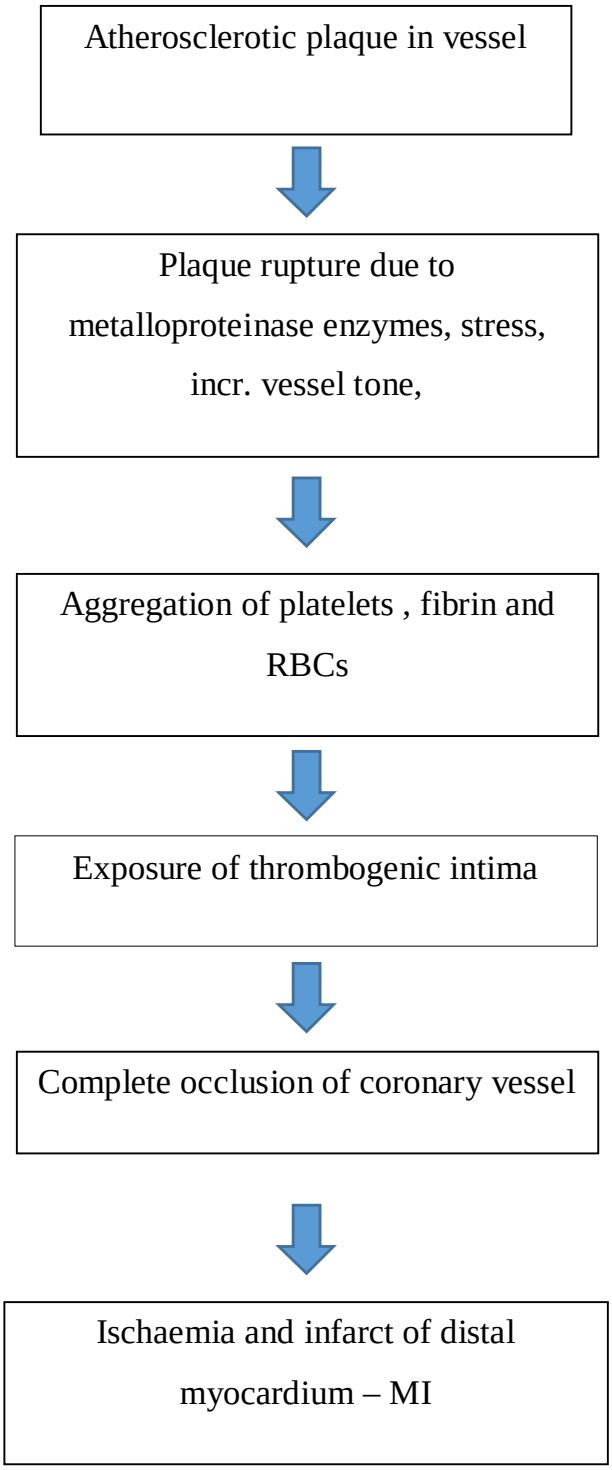
Thrombotic occlusion (acute myocardial infarction)

PATHOPHYSIOLOGY



ECG changes:

QRS changes seen due to alteration in the sequence of depolarization. The typical change is the evolution of Q waves in the leads directly over the infarct area — the Q-wave infarction.

Other abnormalities of the QRS complex - diminution in “R” wave height and notching of the QRS. They are seen in UA or NSTEMI.

PATHOLOGY:

Time Of Occlusion	**Permanent Occlusion/ No Reperfusion**	
	GROSS	HISTOLOGIC
12 HRS	No change	Wavy fibres
24 – 48 hrs	Pallor – yellow	Hypereosinophilic fibers, PMNs at borders
3 – 5 days	Yellow center, hyperemic borders	Large number of PMNs at border coagulation necrosis, loss of nuclei
6 – 10 days	Yellow, depressed central infarct, tan-red margins	Mummified fibers in center, macrophage phagocytosis + granulation tissue at borders
10 – 14 days	Gray red borders, encroaching into the large central tan-yellow infarct	Marked granulation tissue, collagen deposition, sub-endocardialmyocyte sparing
2 – 8 weeks	Gelatin like to gray-white scar, greater healing near border zone areas.	Collagen deposition with prominent large capillaries

So this shows the importance of early thrombolysis by drugs or mechanical methods to save as much of the cardiac myocytes as possible.

CLINICAL PRESENTATION:

The most common presenting complaint in STEMI is pain .It occurs even at rest.

Types of description:

heavy, squeezing, and crushing, sometimes stabbing or burning Radiation to: arms, especially right arm, and the abdomen, back, lower jaw, and neck , to the occipital area but never radiates below the umbilicus.

Pain is usually accompanied by weakness, sweating, nausea, vomiting, anxiousness, and a sense of impending doom. The pain may start when the patient is at rest. When it occurs during exertion, it does not subside with rest, as against angina pectoris.

Less common presentations:

1. Painless MI - Painless STEMIs is more common in diabetes mellitus, and in elderly. In the elderly, STEMI may present as acute dyspnoea, which may progress to pulmonary edema.

2. Sudden loss of: consciousness, a state of confusion, a sensation of profound weakness, the appearance of an irregular heart rate, evidence of peripheral embolism, or merely fall in blood pressure.

Differential diagnosis:

a. Acute pericarditis,

b. Pulmonary embolism,

c. Acute aortic dissection,

d. Costo-chondritis, and

e. Gastrointestinal disorders.

PHYSICAL FINDINGS:

Chest pain with perspiration almost always suggestive of STEMI.

- Tachycardia and hypertension common in AWMI (sympathetic nervous system hyperactivity),
- Bradycardia and hypotension common in IWMI (evidence of parasympathetic hyperactivity)

Auscultatory findings:

- Soft S1.
- S3 and S4 indicating ventricular dysfunction.
- Paradoxical splitting of S2.
- A transient mid-systolic or late systolic apical murmur due to dysfunction of the mitral valve apparatus may be present.

- Pericardial - friction rub.
- Carotid - pulse decreased in volume.
- Temperature elevations up to 38°C observed in the 1st week after STEMI
- Blood pressure: in transmural infarction, systolic pressure falls by nearly 10–15 mmHg from the pre-infarction state.

LABORATORY FINDINGS:

The laboratory tests of value in confirming the diagnosis may be divided into four groups:

Electrocardiogram:

An electrocardiogram (ECG or EKG) is a graphic recording of electric potentials generated by the heart.

Diagnostic ECG criteria for STEMI:

- Peaked upright "T" waves is the 1st ECG manifestation of myocardial injury.
- When ST elevations reach threshold values in two or more anatomically contiguous leads, a diagnosis of STEMI can be made.

1. ST segment elevation two consecutive ECG leads

   - Men > 40 yrs , “ST segment” elevation at the J point > 2mm in leads V2 and V3 , > 1 mm in all leads

   - Men < 40 yrs , “ST segment” elevation at the J point > 2.5 mm in leads V2 and V3

   - In women , “ST segment” elevation at the J point > 1.5mm in leads V2 and V3 > 1 mm in all leads

2. New onset LBBB also is indicative of large anterior wall MI, with worse prognosis

Criteria for ST – segment elevation for prior LBBB or RV – Paced Rhythm : (Sgarbossa’s criteria)

a. ST – Elevation > 1 mm in the presence of a positive QRS complex (concordant with the QRS) (5 points)

b. ST – Elevation > 5 mm in the presence of a negative QRS complex (discordant with the QRS) (3 points)

c. ST – segment depression > 1 mm in V1 & V3 (2 points)

A total of more than or equal to 3 points is suggestive of acute MI, in the presence of “LBBB”, without need for further investigations .

OTHER SCORING SYSTEMS USING ECG:

A. Sclarovsky – Birnbaum score:

Grade I : Tall , peaked , symmetrical T waves

Grade II : Slope elevation of ST segment

Grade III : Distortion of the terminal QRS complex in the form of J point elevation of > 50 % of the preceding R or loss of normal S waves.

B. Anderson Wilkins score –

To assess acuteness of ischaemia. It is calculated as 4 (no. of leads with tall T yes / abnormal Q no) + 3 (no. of leads with neither yes) + 2 (no. of leads with both yes) + 1 (no. of leads with tall T no / abnormal Q yes) divided by total no. of leads with ST elevation.

WELLENS SYNDROME:

Patients presents with chest pain . ECG during chest pain is normal. Following chest pain, symmetric and deep T wave inversion or biphasic T waves may develop in V2 – V6, in the pain free period. There are no pathological Q waves. This is due to tight proximal LAD stenosis.

LOCALISATION OF LESION BASED ON ECG:

Site of infarct	ST - elevation	ST- depression
Antero – septal	V1-V4, qRBBB	II, III, aVF
Antero-lateral	I, aVL, V2-V4	+ V5-V6
Antero-apical	V4-V6, occasionally II, III, aVF	aVL
Lateral wall	I, Avl, V5-V6	
Extensive anterolateral	I , Avl, V1-V6, aVR>V1	
Infero-posterior	II, III, aVF	I, Avl, V2, V3
Posterior wall	V7-V9	V1-V3

1. ANTERIOR WALL MI:

ECG-characteristics

- ST-elevation in leads " V1-V6, I and aVL". Maximum elevation in "V3", maximal depression in "III"
- Later: pathological " Q" wave in the precordial leads "V2 to V4-V5".

Characteristics of proximal LAD occlusion

- "ST-segment" elevation in V1 (>2.5 mm) or "RBBB" with a pathologic "Q" wave or both
- "ST-segment" depression (>1 mm) in "II, III and aVF"

Characteristics of distal LAD occlusion

- Little “ST-segment depression” (<= 1 mm) or elevation in “II, III, and aVF”

2. SEPTAL WALL MI:

“QS” in “V1 and V2.” Later the septum-Q in “V5 and V6” disappears.

3. LATERAL WALL MI :

“ST elevation” in “I, aVL, V5 and V6”

4. INFERIOR WALL MI:

“ST elevation” in “II, III and Avf”

This part of the heart lies on the diaphragm and is supplied by the right coronary artery (RCA) in 80% of patients and In the 20% ; the inferior wall is supplied by the ramus circumflex (RCX).

“ST elevation/ depression” in “V4R” help in differentiating a RCA from an RCX occlusion.

Distal RCA occlusion

- “ST segment elevation” in “III” higher than “ST segment elevation” in “II” ("the highest elevation points at the culprit")and
- “ST segment depression” in “I, AVL, or both” (>1 mm)

Proximal RCA occlusion

- Additional “ST segment elevation” in “V1, V4R or both”

RCX occlusion

- “ST segment elevation” in “I, AVL, V5, and V6” and
- “ST segment depression” in “V1, V2, and V3”

5. POSTERIOR WALL MI :

- High R-waves with “ST-depression” in “V1-V3”.
- Posterior MI caused by occlusion of RCA .

6. RIGHT VENTRICLE MI :

“ST elevation” in lead “V1” and high “R/S ratio in V1 “.

Criteria for Right Ventricular MI

- “ST-elevation” >1 mm in lead “V4” right
- “ST elevation” >1 mm in lead “V1”

Can be seen after a proximal occlusion of the RCA.

Differential Diagnosis of ST-Segment Elevations :

A. Acute pericarditis

B. Normal variants (including "early repolarization" patterns)

C. Left ventricular hypertrophy/left bundle branch block

D. Acute pulmonary embolism

E. Brugada patterns (right bundle branch block–like pattern with ST: elevations in right precordial leads)

F. Class 1-C antiarrhythmic drugs

G. DC -cardioversion

H. Hypercalcemia

I. Hyperkalemia

J. Hypothermia [J (Osborn) waves]

K. Myocarditis

L. Left ventricle tumor

M. Ventricular trauma

CARDIAC ENZYMES:

Damaged cardiomyocytes release - several proteins in the circulation including myoglobin; creatine kinase (CK) and its myocardial band isoenzyme (CK-MB); troponins (I and T), aspartate aminotransferase; and lactate dehydrogenase. Cardiac troponins have high sensitivity and specificity and are currently the preferred biomarkers.

CK-MB is the other alternative because of its rapid) appearance and disappearance from the blood:

1) In earlier presentations;

2) To time the onset of injury; and

3) To detect re-infarction

Blood sampling for “biomarker determination” is recommended at hospital admission and can be repeated at “6 to 9 hours”, and at “12 to 24 hours” if the clinical suspicion is high.

Myoglobin:

Myoglobin is a 17.8-kDa protein that is released from damaged myocardial cells. Myoglobin release occurs within hours after the onset on infarction, peaks at 1 to 4 hours, and plateaus for about 24 hours. But myoglobin should not be used alone for diagnosing MI.

CK-MB:

The MB isoenzyme of creatine kinase has highest concentration in myocardium.

CK-MB appears in serum within about 3 hours after the onset of infarction, peaks at 12 to 24 hours, and plateaus for about 1 to 3 days.

Noncardiac causes of raised CK-MB levels:

1. In hypothyroidism,
2. In extensive skeletal muscle trauma, (rhabdomyolysis)
3. In muscular dystrophies, and
4. Some neuromuscular disorders.

Troponins:

The cardiac troponins regulate the interaction of actin and myosin . They are more cardiac specific than CK-MB.

There are two isoforms of cardiac troponin: T and I. Their levels start to rise 3 to 12 hours after the onset of ischemia, peak at 12 to 24 hours, and plateau for 8 to 21 days (troponin T) or 7 to 14 days (troponin I). Elevated troponin levels indicate pathologically proven necrosis of myocardium and poor prognosis in patients with ACS.

ECHOCARDIOGRAPHY:

Used as a screening tool because of the ease and safety of the procedure.

USES:-

a. Detection of the presence or absence of “wall motion abnormalities” help in management decisions.
b. It is useful in estimation of left ventricular (LV) function

c. Identification of RVMI , ventricular aneurysm, pericardial effusion, and LV thrombus.

d. "Doppler echocardiography" is useful in the detection of VSD and MR, the 2 serious complications of STEMI.

RADIONUCLIDE IMAGING TECHNIQUES:

They are used less often than echocardiography because they are more cumbersome and lack sensitivity and specificity.

Myocardial perfusion imaging:

Done with "[^{201}Tl] or [^{99m}Tc]- sestamibi", which are distributed in proportion to myocardial blood flow and concentrated by viable myocardium. They reveal a defect ("cold spot") after development of a transmural infarct in the 1st few hours.

Disadvantage: not specific for the diagnosis of acute MI as it cannot distinguish acute infarcts from chronic scars.

Radionuclide ventriculography: done with "[^{99m}Tc]-labeled red blood cells", it frequently shows wall motion disorders and reduction in the ventricular EF in patients with STEMI.

Use: In assessing the hemodynamic consequences of infarct and when the RV ejection fraction is depressed it suggests RV infarction

Disadvantage: It is nonspecific, as many cardiac abnormalities show similar pattern.

MANAGEMENT:

1. IV: "NS on D_5W" to keep vein patent.
2. Vital signs: every 1.5 hr until stable, then every 4 hr and as needed.
3. Monitor: Continuous ECG to watch out for dysrhythmia and "ST segment deviation"
4. Oxygen: Continuous oximetry monitoring at 2 liters/min if stable for 6 hr,
5. Medications:

    - Nitroglycerin (NTG): Use sublingual NTG - 0.4 mg every 5 min as needed for chest discomfort. Intravenous NTG for - CHF, hypertension, or persistent ischemia.
    - Aspirin (ASA; acetylsalicylic acid): If Aspirin not given in the ED, chew non -enteric-coated ASA – 162-325 mg. If Aspirin has been given, start daily maintenance of 75-162 mg daily
    - Oral P2Y12 Inhibitors: loading dose of 300 mg stat followed by 75 mg OD of T.clopidogrel. Other agents used are T. prasugrel and T. ticagrelor.
    - GP IIb/IIIaInhibitors: used as an alternative to oral P2Y12 inhibitors especially in those undergoing PCI.

- Beta blocker: If not given in the ED, assess for contraindication (i.e., bradycardia and hypotension); If given in the ED, continue daily dose and optimize as dictated by heart rate and blood pressure.

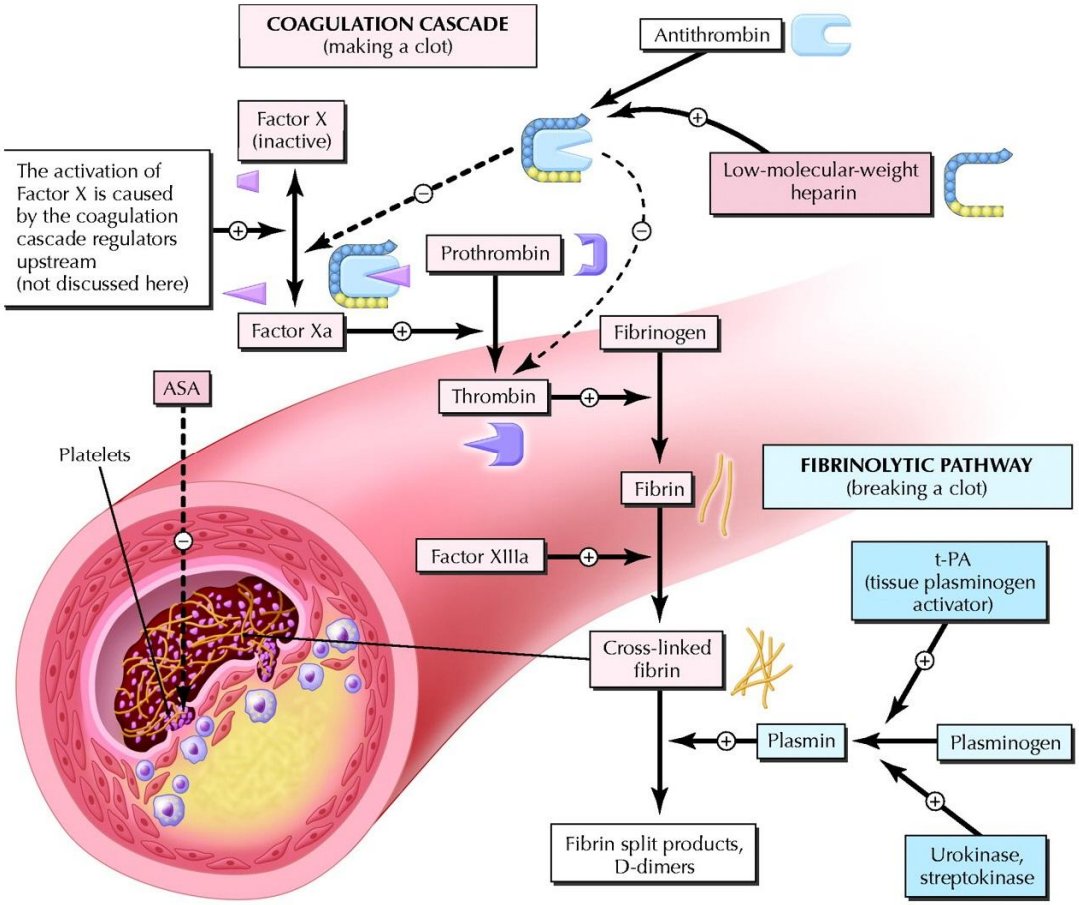
- Angiotensin-converting enzyme (ACE) inhibitor: Start ACE inhibitor orally in patients with “LVEF <40 percent” if the following are absent: hypotension (SBP <100 mm Hg or <30 mm Hg below baseline) or known contraindications ACEI.

- Angiotensin receptor blocker (ARB): only in those who cannot tolerate ACEI.

- Pain medications: IV morphine sulfate 2-4 mg with increments of 2-8 mg IV at 5- to 15-min intervals as needed .

- Anxiolytics

- Stool softener



REPERFUSION THERAPY:

It can be done by two methods:

1.Fibrinolytic drugs

2.PCI

Regardless of whether reperfusion is achieved by fibrinolysis or PCI, restoration of blood flow in the obstructed coronary artery after the onset of symptoms of chest pain, palpitations etc in patients with STEMI, is a key factor of short- and long-term outcome.

FIBRINOLYTIC AGENTS:

Classified as fibrin and non-fibrin specific .

Fibrin specific - streptokinase, anistreplase, urokinase

Non-fibrin specific - alteplase, reteplase, tenecteplase.

Streptokinase (a beta -hemolytic streptococcal isolate) still is the most frequently employed thrombolytic agent especially in developing world where Cath labs at tertiary hospitals for primary PCI is still beyond reach for the population at large .

COMPARISON OF FIBRINOLYTIC DRUGS :

Characteristic	**Streptokinase**	**Alteplase**	**Reteplase**	**Tenecteplase**
Dose	1.5×10^6 U in 30–60 min	Up to 100 mg in 90 min	2 x 10 U bolus	0.5 mg/kg bolus
Antigenicity	++	–	–	–
Fibrin specificity	–	++	+	+++
Cost	+	+++	+++	+++

STREPTOKINASE :

It was discovered in 1933 by “William Smith Tillett” along with his student “Sol Sherry.”

In 1958, “Sherry “and others started using streptokinase in MI patients which lead to “cure” of the patients . Currently streptokinase is the most important drug in the management of MI especially in developing countries like India .

MECHANISM OF ACTION :

The streptococcal substance – fibrinolysin , activates the proteinase precursor , resulting in its conversion to an active enzyme . The active serum proteinase then lyses the fibrin clot.

INITIAL USE OF STREPTOKINASE :

a. To treat fibrinous and purulent pleural effusions

b. Haemothorax

c. Tuberculous meningitis

THE GISSI TRIAL :

GISSI - GruppoItaliano per la - Sperimentazioned :
ellaStreptochinasinell'Infarto - Miocardico .

At the GISSI trial , the initial report changed the outlook of physicists all over the world regarding thrombolytic therapy for STEMI. Around 11,806

patients from 176 coronary care units in different hospitals were included during a period of 17 months (February 1984 to June 1985) for the study. The results showed patients had higher chance of survival if the time was shorter between the symptom onset and the streptokinase infusion .

The final report of GISSI, published in "*The Lancet* "after a 12-month follow up period, proved the usefulness of streptokinase. There was a significant difference in mortality rates between the streptokinase group and the non-streptokinase group (controls) at - 12 months.

Thus, GISSI succeeded in firmly establishing the efficacy of intravenously administered streptokinase.

OTHER TRIALS :

GUSTO , GISSI-2 , ISIS-3 TRIAL:

All three trials compared the efficacy of tissue - plasminogen activator (t-PA) with that of streptokinase.

GUSTO (Global Utilization of - Streptokinase and Tissue Plasminogen Activator for Occluded Coronary Arteries) found no - significant difference in: mortality rates after 1 month.

GISSI-2 (GruppoItaliano per so -Studio dellaSopravvienzane: ll'InfartoMiocardico) found no significant difference in mortality rates at 6 months

ISIS-3 (Third International Study of Infarct Survival Collaborative Group) found no significant differences in mortality rates

GUSTO-3 and ASSENT (Assessment of the Safety and Efficacy of a New -Thrombolytic Regimen), showed no superiority with reteplase, and equivalent results with tenecteplase,

ABSOLUTE CONTRAINDICATIONS :

a. A history of intra cerebral hemorrhage at any time
b. A non hemorrhagic stroke or other cerebrovascular event in the last one year
c. Suspicion of aortic dissection
d. Active internal bleeding
e. Closed head injury within 3 months
f. Acute pericarditis
g. Known structural cerebrovascular lesion – AVMs, aneurysms , tumor

RELATIVE CONTRAINDICATIONS :

a. Current use of anticoagulants (international normalized ratio >2)
b. A recent (<2 weeks) invasive or surgical procedure
c. Prolonged (>10 min) cardiopulmonary resuscitation
d. Known bleeding diathesis

e. Pregnancy

f. A hemorrhagic ophthalmic condition (e.g., hemorrhagic diabetic retinopathy),

g. Active peptic ulcer disease

h. Allergy or previous use of streptokinase

i. Non-compressible vascular punctures

j. Uncontrolled hypertension – SBP > 180 mm Hg , DBP > 110 mm Hg

INFLUENCE OF FACTORS ON THROMBOLYSIS:

INFLUENCE OF AGE ON THROMBOLYSIS:

Age is by far the single most important predictor of ultimate survival after acute myocardial infarction. In fact, in GUSTO-1 trial, the 24-hour mortality for the elderly was 10 times greater than that of the youngest patients. This stresses the importance to consider thrombolytic therapy in this exceptionally high–risk group.

A Study on “Acute Coronary Syndrome In Elderly – The Difference, Compared With Young In Intensive Care Unit Of A Tertiary Hospital” In Western Nepal was done on patients admitted to ICU in the “Manipal Teaching Hospital “in the month of “March 2006 to June 2007”. Out of 153 patients were analyzed - elderly patients (> 65 yrs) constituted 51% (78) of the study population . The success rate of thrombolysis was lower in elderly patients (50%) as compared to young patients (76.9%). The end result of the

study was elderly patients are more prone to complications; have less success rate for thrombolysis and; have a higher mortality rate when compared to young patients.

INFLUENCE OF SEX ON THROMBOLYSIS:

Gender does not influence the success rate of thrombolysis. The only clinical condition that had increased thrombolytic usage in women compared to men was a history of prior myocardial infarction.

A study "Gender and acute myocardial infarction: is there a different response to thrombolysis?" was conducted by Woodfield SL1, Lundergan CF and co . Patency rates and global and regional left ventricular function were determined in patients at 90 min and "5 to 7 days" after thrombolytic therapy for acuteMI. The results "ninety-minute post thrombolysis" in women and men were 39% and 38%, respectively ($p = 0.5$). Women had more recurrent ischemia than men. The conclusion of the study was women do not differ significantly from men with regard to early infarct-related artery patency rates .Gender was a factor independent of the success and failure rate of thrombolysis.

INFLUENCE OF LIFESTYLE ON THROMBOLYSIS:

Regular physical activity can produce long term health benefits. Many clinical trials have shown that "low physical activity" is an independent and a strong risk factor for CVS as well as all-cause mortality.

Low physical activity is associated with the following diseases :

- Coronary - artery disease
- Cerebrovascular diseases
- Type II - diabetes mellitus
- Obesity
- Depression disorder

Occupational physical activity can be classified as below:

i. High physical activity : lots of walking and ; lifting at work (eg. Agricultural work, industrial work)

ii. Moderate physical activity: walking quite a lot at work; without lifting or carrying heavy objects.

iii. Low physical activity: mostly sedentary work; without much walking (eg. Working at office, homemaker)

Community activity is classified as :

i. High : "> 30 min" physical activity (walking , cycling) per day

ii. Moderate : exercising between 15 to 30 min per day

iii. Low : exercising < 15 min per day

Effect on thrombolysis:

Lifestyle has no influence on the result of thrombolysis.

INFLUENCE OF SMOKING ON THROMBOLYSIS:

India has approximately 120 million smokers. According to WHO, 12% of world's smokers are in India. Smoking causes 9 lakh deaths per year in India. According to 2002 WHO report, 30% of Indian adult males are smokers. Among adult females, it is around 3 to 5% .

Smoking increases blood hematocrit, fibrinogen levels and platelet levels contributing to the hypercoagulable state promoting coronary thrombosis. Smokers are also found to have lesser fibrinolytic activity than nonsmokers.

Pack years:

Formula to measure the amount of cigarettes smoked by a person over a period of time. It is calculated by total no. of packs of cigarettes smoked per day multiplied by the total no. of years the person has smoked.

Effect on thrombolysis :

Smokers have lower mortality after acute coronary syndrome than non-smokers. This is due to the 1 younger age, 2 lower co-morbidity, 3 more aggressive treatment and 4 lower risk profile of the smoker. Non-smokers with ECG evidence of failed thrombolysis had 40% short-term mortality and had higher plasma fibrinogen than current smokers. Lower cardiac mortality in

smokers may probably be due to complete systemic fibrinolysis. The term "smoker's paradox" was introduced into scientific discourse more than 25 years ago following observations that smokers (in comparison to non-smokers) experience decreased mortality following an acute MI. But recently it has been argued that “smoking paradox” is not because of any benefit from smoking but simply because smokers are likely to undergo such procedures at a much younger age and thus have an average lower comorbidity. The paradox, however, has not been demonstrated in those undergoing routine early invasive management.

A study “Lower cardiac mortality in smokers following thrombolysis for acute myocardial infarction may be related to more effective fibrinolysis”. Of the 332 patients with AMI, 48% were current smokers, 19% previous smokers and 33% had never smoked. Results were a successful thrombolysis (by 60 mins) was achieved by 44% of current smokers compared with 43% of non-smokers. Unsuccessful thrombolysis (by 180 min) was seen in “35%” of non-smokers as compared to “16%” of current smokers ($p<0.05$). The conclusion of the study was cigarette smoking was associated with lower short-term cardiac mortality in patients receiving thrombolysis for AMI.

The “International Tissue Plasminogen Activator/Streptokinase Mortality Trial” showed A "smoker's paradox" and GISSI-2 trial showed only a non-significant trend for better outcome for smokers. These two studies bring forward the problem of the classification of former smokers.

In the “GUSTO-1” study, 40,599 patients were included to analyse 30-day mortality in relation to smoking. Smokers paradox was first coined in this

study. The "smoker's paradox" was predominantly observed in AMI patients selected according to the “WHO criteria” of the 1980s and 1990s during which time fibrinolysis was the dominant reperfusion strategy for AMI patients.

INFLUENCE OF SYSTEMIC HYPERTENSION ON THROMBOLYSIS

Hypertension is one of the leading causes of the global burden of disease. Nearly “13–15%” of the total deaths were attributable to high BP in 2001. Hypertension doubles the risk of cardiovascular diseases, including coronary heart disease (CHD), congestive heart failure (CHF), ischemic and; hemorrhagic stroke, renal failure, and peripheral arterial disease.

JNC 8 criteria:

A person is said to be hypertensive and in need of medication if :

i. In age > 60 years : BP > 150/90 mm of Hg

ii. In age < 60 years : BP > 140/90 mm of Hg

iii. In diabetics and CKD patients : Target BP should be <140/90 mm of Hg

Effect on thrombolysis:

Though high BP is a major risk factor for CAD, hypertension per se has no major influence on the success or failure of thrombolysis.

A trial was conducted where a total of 373 patients (177 of whom had antecedent hypertension) were treated by thrombolysis because of STEMI. All

parameters were compared between the patients with and without hypertension. It was shown that hypertensive patients who received thrombolysis had higher rates of in-hospital mortality and major adverse cardiac events than patients without hypertension.

A similar study “Original research Factors influencing the outcome of thrombolysis in acute myocardial infarction” was done by DrGirishRonad et al at, Department of General Medicine, ESIC Medical College, Gulbarga from October 2011 to October 2013. A total of 100 patients were included in the study. The success rate of thrombolysis was not found to be different among hypertensive/non hypertensive patients . Among the 30 hypertensives, 21 were thrombolysed successfully and among the 70 non-hypertensives, 44 were thrombolysed successfull. p value was 0.47 i.e. insignificant.

INFLUENCE OF DIABETES ON THROMBOLYSIS:

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. The two broad categories of DM are designated type 1 and type 2 . “Type 1 DM” results from complete or near-total insulin deficiency. “Type 2 DM” is a heterogeneous group of disorders characterized by variable degrees of insulin resistance, impaired insulin secretion, and increased glucose production. Type 2 DM is usually preceded by - impaired fasting glucose (IFG) or impaired glucose tolerance (IGT).

The worldwide prevalence of DM has risen dramatically from around “30 million” cases in 1985 to “285 million” in 2010. Based on current trends, the IDF projects that “438 million” individuals will have diabetes by the year 2030 . DM increases with aging . India has the second largest population with diabetes. But it is estimated that at the current rate of progress, diabetics population in India will double in next 15 years and India will become the diabetic capital of the world by 2030.

Criteria for the diagnosis of Diabetes Mellitus:

i. Symptoms of diabetes plus RBS of >200 mg/dL or

ii. FBS of >126 mg/dL or

iii. A1C > 6.5% or

iv. Two – hour PPBS >200 mg/dL after an oral glucose tolerance test

Chronic complications of Diabetes:

- Microvascular complications:

    a) Retinopathy

    b) Neuropathy

    c) Nephropathy

- Macrovascular complications:
    a) Coronary artery disease
    b) Cerebrovascular disease
    c) Peripheral artery disease
- Other systems
    a) Gastrointestinal
    b) Genitourinary
    c) Dermatologic
    d) Infectious
    e) Cataract and glaucoma
    f) Periodontal disease
    g) Hearing loss

Effect on thrombolysis:

"Type 2 diabetes" is a strong predictor of acute intravenous thrombolysis failure during STEMI. On receiving thrombolysis, the "diabetics" fare worse than the "non-diabetics", manifesting as impaired post thrombolysis left ventricular function and poor prognosis. Diabetes causes accumulation of fatty acid intermediates which in turn promote ischemic injury through several mechanisms, 1 including direct toxicity, 2 increased

oxygen demand, 3 direct inhibition of glucose oxidation, and 4 subsequent production of free radicals which lead to loss of integrity of membrane and eventually cell death.

A similar study “A comparative study on the effect of streptokinase between diabetic and non-diabetic myocardial infarction patients” was conducted by Md. Anup Rahman Chowdhury et al . Off the 187 study subjects with acute MI admitted at CCU, “126”patients were non-diabetic and” 61 “patients were diabetic. Streptokinase was administered to all patients. Resolution (reduction) of “elevated ST segment was evaluated after 90 minutes of streptokinase administration. “Successful thrombolysis” (≤70% ST-resolution) was significantly higher in non-diabetic than diabetic ($p<0.001$), while “unsuccessful thrombolysis” (<30% ST resolution) was significantly higher in diabetic patients ($p<0.001$). It was concluded that diabetes mellitus might affect the thrombolytic outcome of acute MI in patients with diabetes mellitus.

INFLUENCE OF WINDOW PERIOD ON THROMBOLYSIS:

Fibrinolytic therapy can reduce the relative risk of in-hospital death by “up to 50%” when administered within the first hour of the onset of symptoms of STEMI, and much of this benefit is maintained for at least 10 years. The timing of reperfusion therapy by fibrinolysis or a catheter-based approach is important because myocardium can be saved only before it has been irreversibly injured . “Every minute is important” and those treated within 1–3 h of the onset of symptoms generally benefit the most.

Some benefit is still possible even up to 12 h, especially if chest discomfort is still present and ST segments remain elevated.

Door to needle time – it describes the time taken to administer the fibrinolytic agent after the patient has entered the ER door. The shorter the door to needle time, the more efficient ER is to cope with MI.

Door to balloon time – the interval between the arrival of the patient in the ER till the guidewire catheter crosses the occluded coronary artery in the cardiac cathlab.

The success rate is higher if the patient presents earlier to hospital (< 3 hours). The success rate declines as time progresses up to 12 hours after which time, fibrinolysis is rarely attempted.

At the GISSI trial, the initial report changed the outlook of physicists all over the world regarding thrombolytic therapy for STEMI. Around 11,806 patients from 176 coronary care units in different hospitals were included during a period of 17 months (February 1984 to June 1985) for the study. The results showed patients had higher chance of survival if the time was shorter between the symptom onset and the streptokinase infusion.

INFLUENCE OF SITE OF THROMBUS IN CORONARY ARTERY ON THROMBOLYSIS:

There are two coronary arteries, a left coronary and a right coronary. They arise from the left and right aortic sinuses respectively. Left main coronary artery divides into two main branches – LAD and LCX. The

dominating artery is the one which supplies the posterior inter ventricular septum.

Inferior wall infarcts have higher rate of successful thrombolysis compared to anterior infarcts. The reason for this differential response will be evident when we look into the physiology of coronary circulation in right and left coronary arteries. Blood flow in right coronary artery is relatively independent of phases of cardiac cycle, being present in both systole and diastole. Whereas flow in left coronary artery is almost absent during systole and may even be reversed in conditions of heightened micro vascular tone and left ventricular hypertrophy.

A Study "Predictors of inhospital outcome after acute inferior wall myocardial infarction" was conducted by "Jim MH1, Chan AO, Tse HF, Lau CP et al". From January 1997 to March 2006, around 546 patients suffering from their first inferior wall myocardial infarction were included in the study. On comparing results with AWMI, IWMI is generally regarded as being low risk and had better rate of success in thrombolysis.

Similar observations were made by C.Michael Gibson, Sabina Murphy and E. Brawnwald et al (TIMI study group). 8 They found that TIMI grade III flow rates were lower for left coronary and circumflex artery compared to right coronary artery after thrombolytic therapy.

INFLUENCE OF KILLIP'S CLASSIFICATION ON THROMBOLYSIS

In 1967 Killip proposed a prognostic classification scheme based on whether the patient has rales on auscultation, in patients presenting with STEMI . The classification remains useful even today as seen from many MI trials. The classification is as follows:

Class I: "no rales" or a third heart sound.

Class II: rales present but only to a "mild to moderate degree" (<50 percent of lung fields) and may or may not have an S_3

Class III : rales in > 50% of each lung field and with "pulmonary edema."

Class IV : "cardiogenic shock"

It has been found that Killip's class greatly influences the thrombolysis outcome.

A study "Original research Factors influencing the outcome of thrombolysis in acute myocardial infarction" was done by DrGirishRonad et al at, Department of General Medicine, ESIC Medical College, Gulbarga from October 2011 to October 2013. A total of 100 patients were included in the study. The major finding of this study is that the time window period, location of infarct and haemodynamic (Killips) class significantly affected the outcome of thrombolysis. For Killip classification , the p value was found to be < 0.05 (statistical significance), with success rate highest for those who presented in KC I and failure rate highest for those who presented in KC IV.

MATERIALS AND METHODS

PLACE OF STUDY:

The study was undertaken in IMCU , Department of General Medicine and Department of Cardiology, Chengalpattu medical college and hospital, Chengalpattu.

DURATION OF STUDY : 1 year (June 2014 – May 2015)

POPULATION TO BE STUDIED : 100

STUDY GROUP:

20 TO 75 Yrs age group complaining of chest pain and ECG showing ST elevation (AWMI / IWMI)

STUDY SETTING:

IMCU, Dept of General Medicine, Chengalpattu Medical College and Hospital, Chengalpattu

INCLUSION CRITERIA

All patients with symptoms of Myocardial Infarction and showing ECG features of ACS STEMI – ST segment elevation in leads.

1. ST segment elevation two consecutive ECG leads

   - Men > 40 yrs, “ST segment elevation “at the J point > 2mm in leads V2 and V3, > 1 mm in all leads
   - Men < 40 yrs, “ST segment elevation” at the J point > 2.5 mm in leads V2 and V3
   - In women, “ST segment elevation” at the J point > 1.5mm in leads V2 and V3, > 1 mm in all leads

2. New LBBB

3. Evidence of posterior MI

   - Threshold for abnormal St elevation at the J point is > 0.5 mm

EXCLUSION CRITERIA:

Adults not showing features of ACS – STEMI in ECG

DATA COLLECTION:

The participants were explained about the study and informed consent was obtained. Then they were interviewed and analysed for inclusion/ exclusion criteria. Cases which met the inclusion criteria and did not have any exclusion criteria were selected to participate in the study. 102 cases were included.

- Detailed history regarding patient’s age, time of presentation to hospital from the onset of symptoms, lifestyle, history of smoking, history of drug intake for hypertension or diabetes were asked. Patients with low

physical activity and low commuting activity were taken as leading a sedentary lifestyle. Those who smoked > 5 cigarettes per day were considered as smokers. Symptom to needle time was taken for window period. Blood pressure was recorded and patients was auscultated for tabulating the patient as per Killip classification.

INVESTIGATIONS DONE :

Blood pressure recording: Sphygmomanometer is used to record the blood pressure. BP is recorded in sitting posture in the right upper arm. Phase I Korotkoff sound was taken as systolic BP and disappearance of the sound (phase IV) was taken as diastolic BP.

Electrocardiogram (ECG): ECG changes of present myocardial infarction confirmed by echocardiography by an experienced cardiologist .ECG was taken to classify patients as having AWMI or IWMI or LWMI or Triple vessel disease.

Blood samples for RBS, FBS /PPBS:

- Fasting blood glucose : done after 8 hours of fasting
- Postprandial blood glucose : done 2 hours after taking food.

Participant is diagnosed to be a diabetic if any one of the following is present:

- FBS > 126 mg / dl
- PPBS > 200 mg / dl
- Patient already on anti – diabetic drugs

RESULTS AND ANALYSIS

- **102** acute “ST elevation myocardial infarction” cases were included in the study.
- Detailed history regarding patient’s age, time of presentation to hospital from the onset of symptoms, lifestyle, history of smoking, history of drug intake for hypertension or diabetes were asked.
- Blood pressure was recorded and patients was auscultated for tabulating the patient as per Killip classification.
- ECG was taken to classify them as AWMI or IWMI or LWMI or Triple vessel disease.
- The various data were compared with successful / unsuccessful thrombolysis and their influence analysed.
- The available data was subjected for statistical analysis.
- The statistical comparison was done using “SPSS”.
- The “p value of less than 0.05” was considered as statistically significant.
- Charts and bar diagrams are shown to bring out the significance and understand them more easily.

TABLE 1: INFLUENCE OF AGE ON SUCCESS OF THROMBOLYSIS

	Success			Failure		
	Number	Percentage within age	Percentage within result	Number	Percentage within age	Percentage within result
< 40 yrs	12	66.7%	17.1%	6	33.3%	18.8%
40 – 60 yrs	43	76.8%	61.4%	13	23.2%	40.6%
>60 yrs	15	53.6%	21.4%	13	46.4%	40.6%

Pearson Chi – Square –

Value – 2.786

Df – 2

P = 0.248.

Age has no significant relation with the success of thrombolysis.

CHART 1 : SUCCESSFUL THROMBOLYSIS – AGEWISE

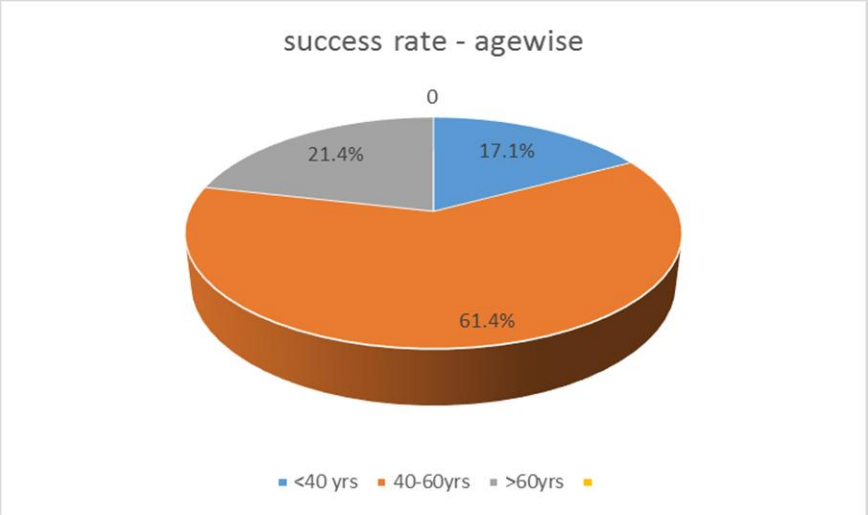


CHART 2: THROMBOLYSIS FAILURE – AGEWISE

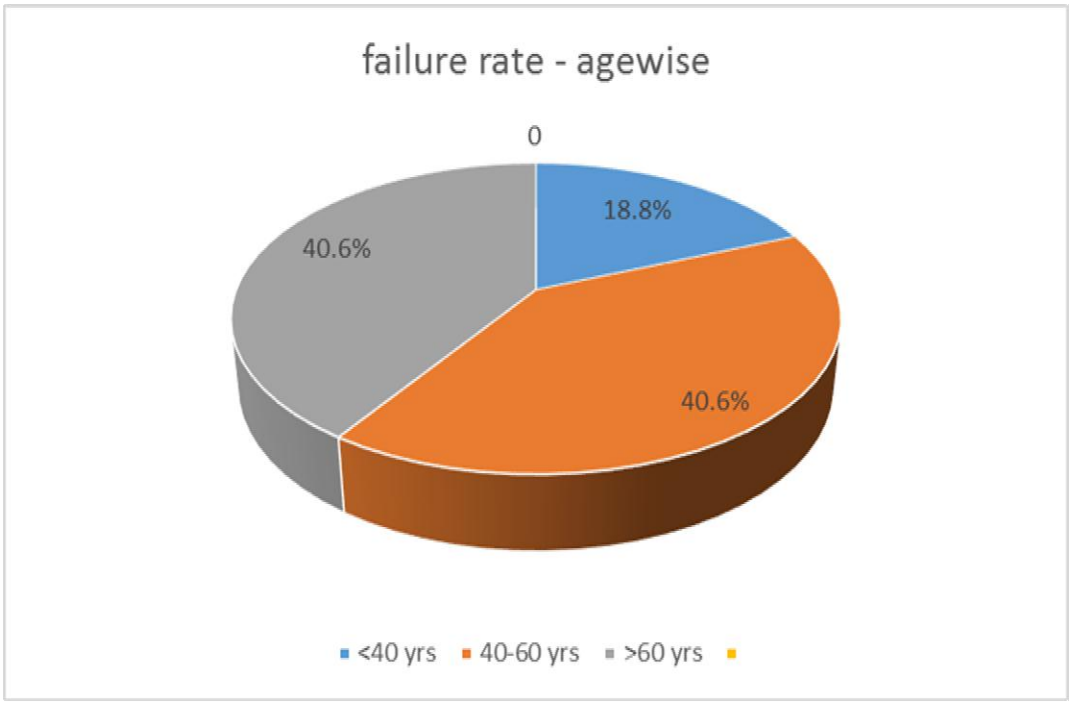


CHART 3 : AGEWISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS

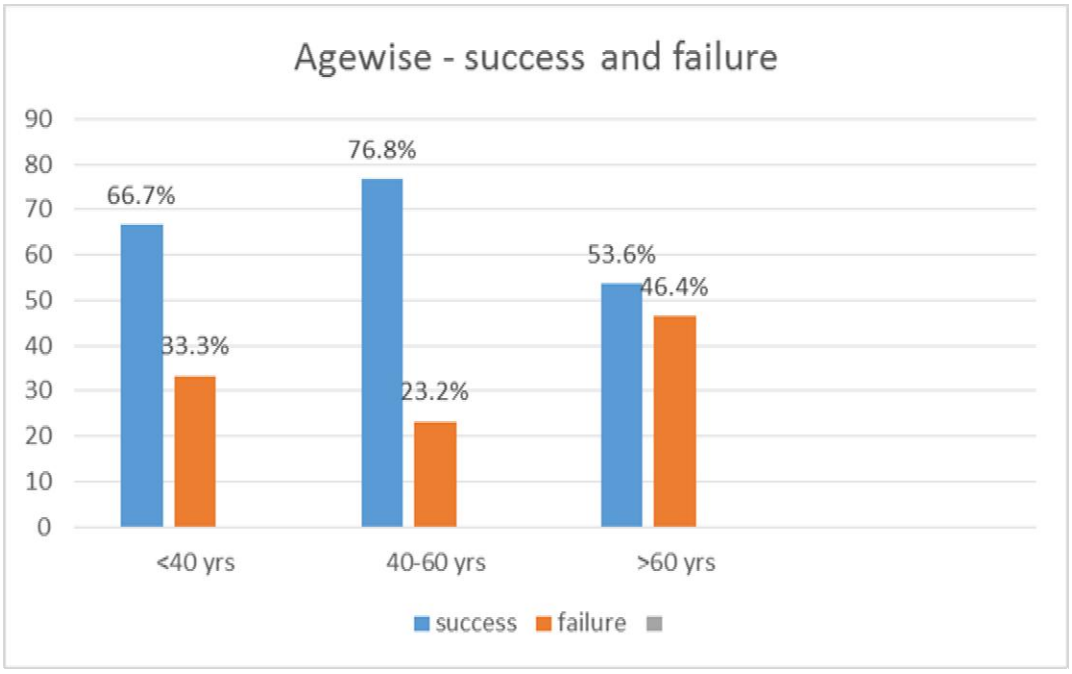


TABLE 2 : INFLUENCE OF SEX ON SUCCESS OF THROMBOLYSIS

	Success			Failure		
	Number	Percentage within sex	Percentage within result	Number	Percentage within sex	Percentage within result
Male	52	67.5%	74.3%	25	32.5%	78.1%
Female	18	72%	25.7%	07	28%	21.9%

Pearson Chi – Square –

Value – 0.175

Df – 1

P = 0.676 .

Fisher's exact test = 0.439.

Sex has no significant relation with the success of thrombolysis.

CHART 4 : SUCCESSFUL THROMBOLYSIS – SEXWISE

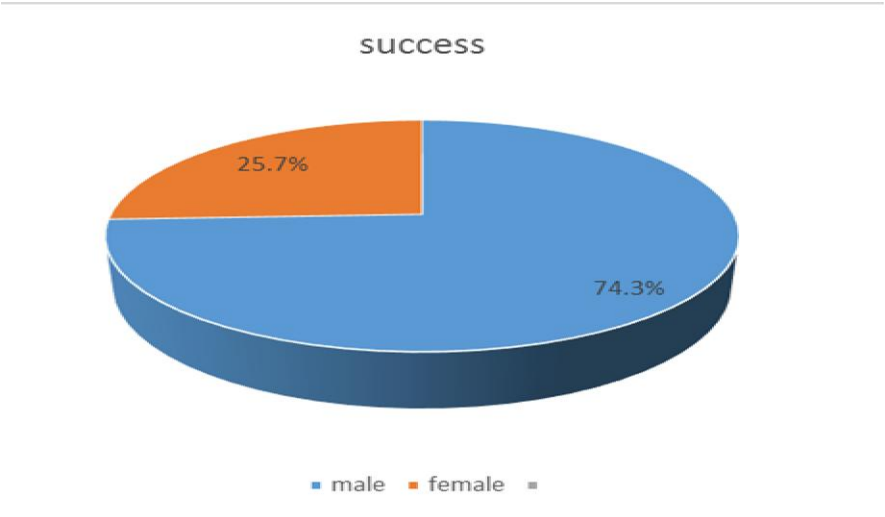


CHART 5 : THROMBOLYSIS FAILURE – SEXWISE

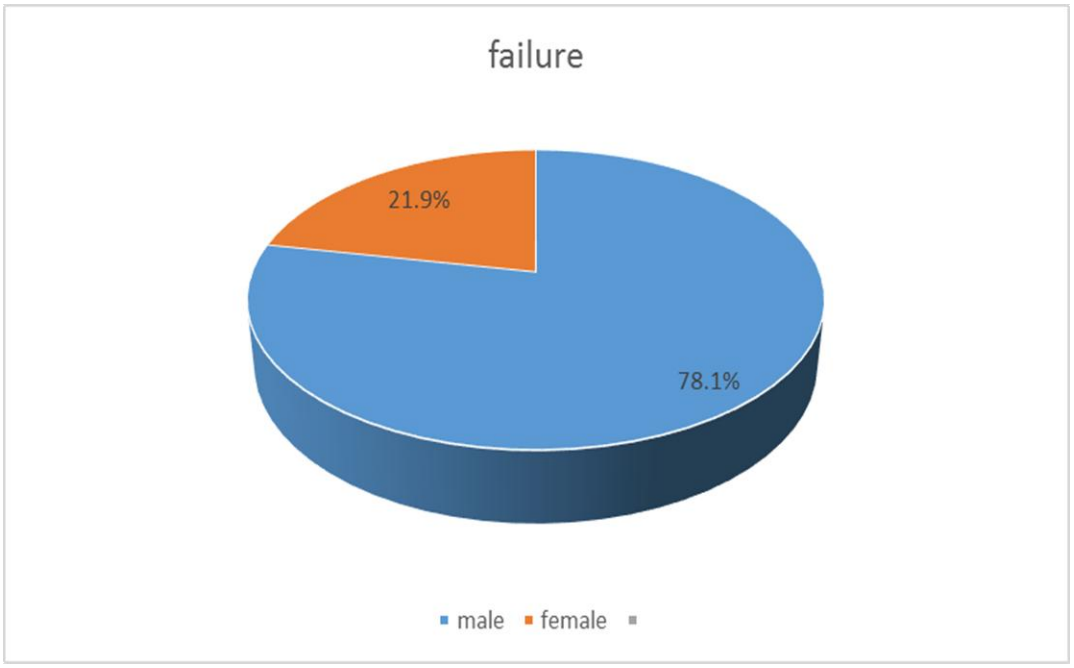


CHART 6 : SEXWISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS

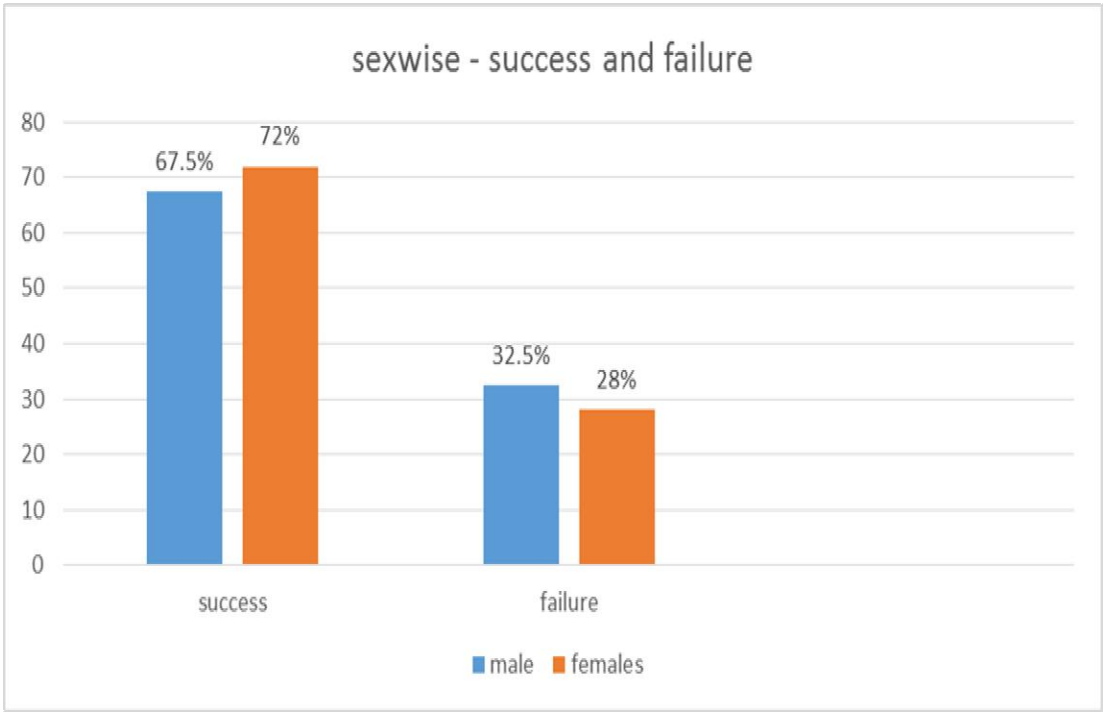


TABLE 3 : INFLUENCE OF LIFESTYLE ON SUCCESS OF THROMBOLYSIS

	Success			Failure		
	Number	Percentage within lifestyle	Percentage within result	Number	Percentage within lifestyle	Percentage within result
Sedentary	29	61.7%	41.4%	18	38.3%	56.2%
Active	41	74.5%	58.6%	14	25.5%	43.8%

Pearson Chi – Square –

Value – 1.942

Df – 1

P = 0.163.

Fisher's exact test = 0.119 .

Lifestyle has no significant relation with the success of thrombolysis

CHART 7 : SUCCESSFUL THROMBOLYSIS – LIFESTYLE WISE

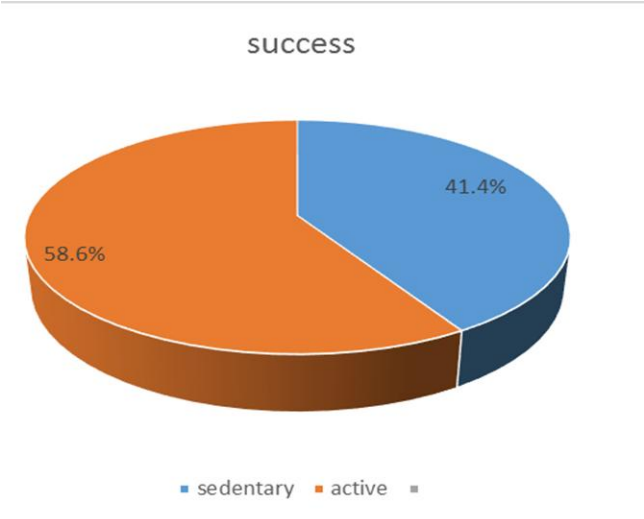


CHART 8 : THROMBOLYSIS FAILURE – LIFESTYLE WISE

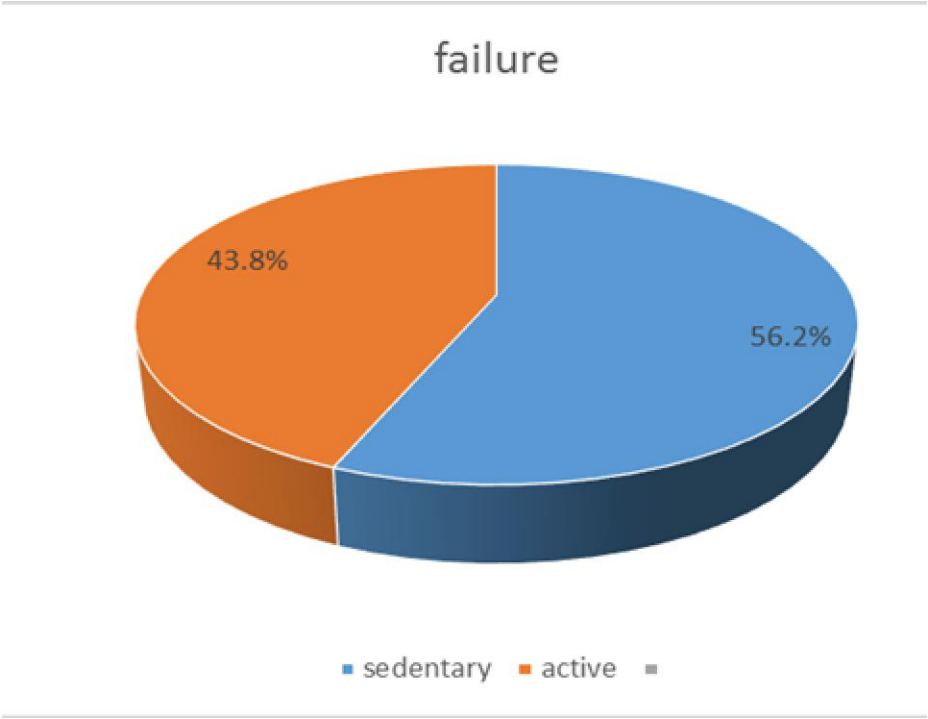


CHART 9 : LIFESTYLE WISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS

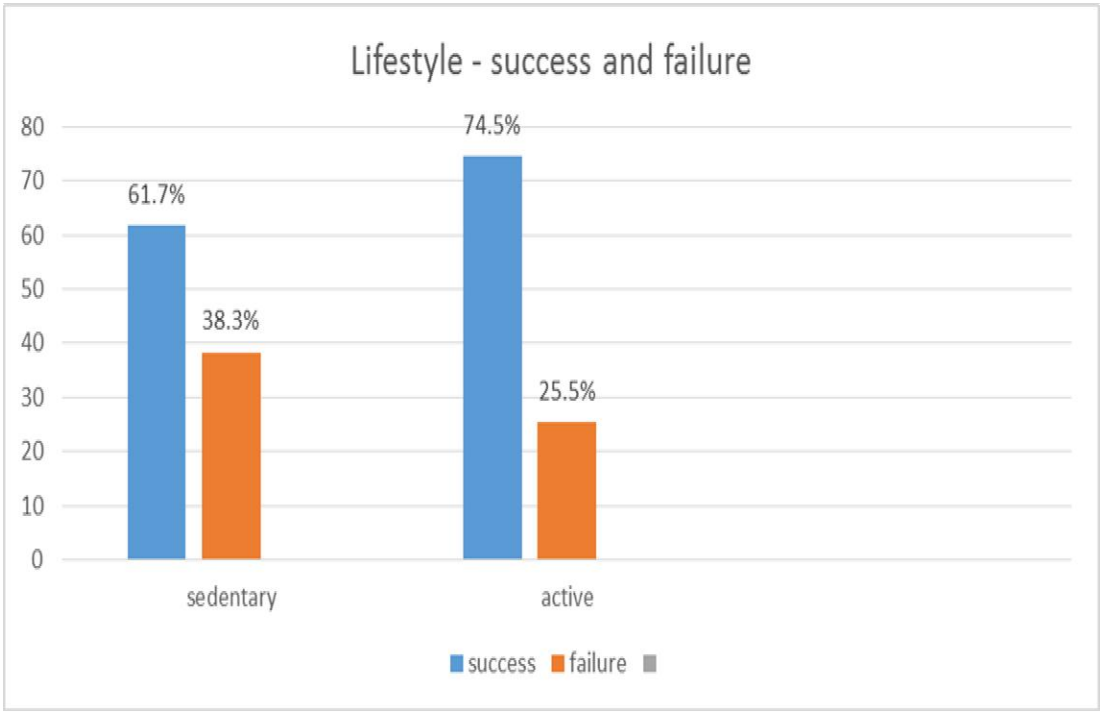


TABLE 4 : INFLUENCE OF SMOKING ON SUCCESS OF THROMBOLYSIS

	Success			Failure		
	Number	Percentage within smokers	Percentage within results	Number	Percentage within smokers	Percentage within results
Smoker	32	72.7%	45.7%	12	27.3%	37.5%
Non – smoker	38	65.5%	54.3%	20	34.5%	62.5%

Pearson Chi – Square –

Value – 0.604

Df – 1

P = 0.437 .

Fisher's exact test – 0.288.

Smoking has no significant relation with the success of thrombolysis .

CHART 10 :SMOKING INFLUENCE ON UNSUCCESSFUL THROMBOLYSIS

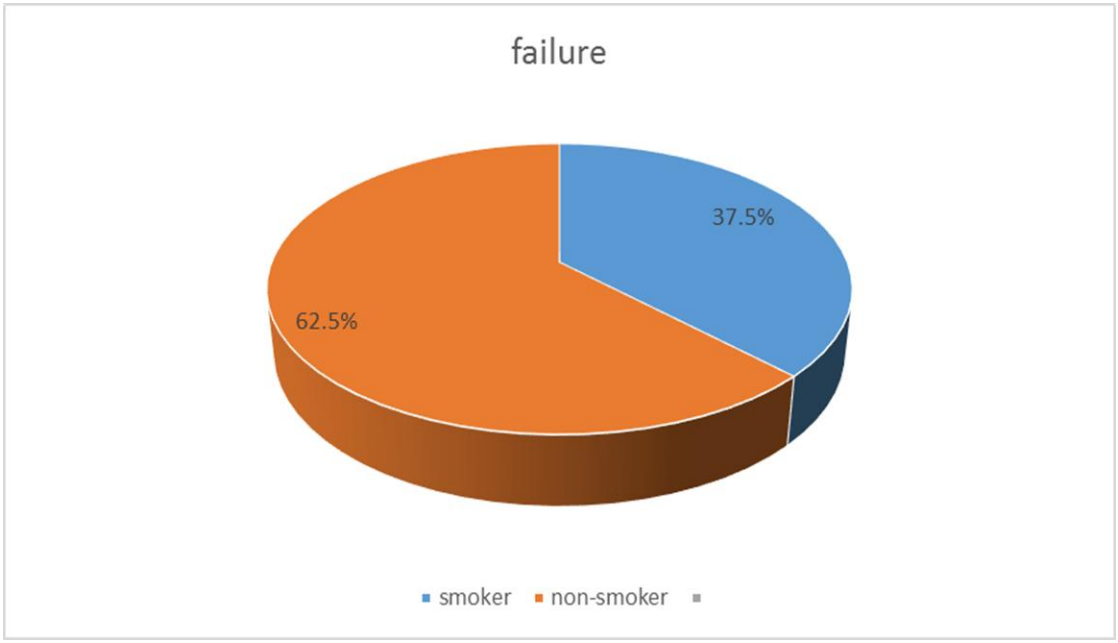


CHART 11 : H/O SMOKING WISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS

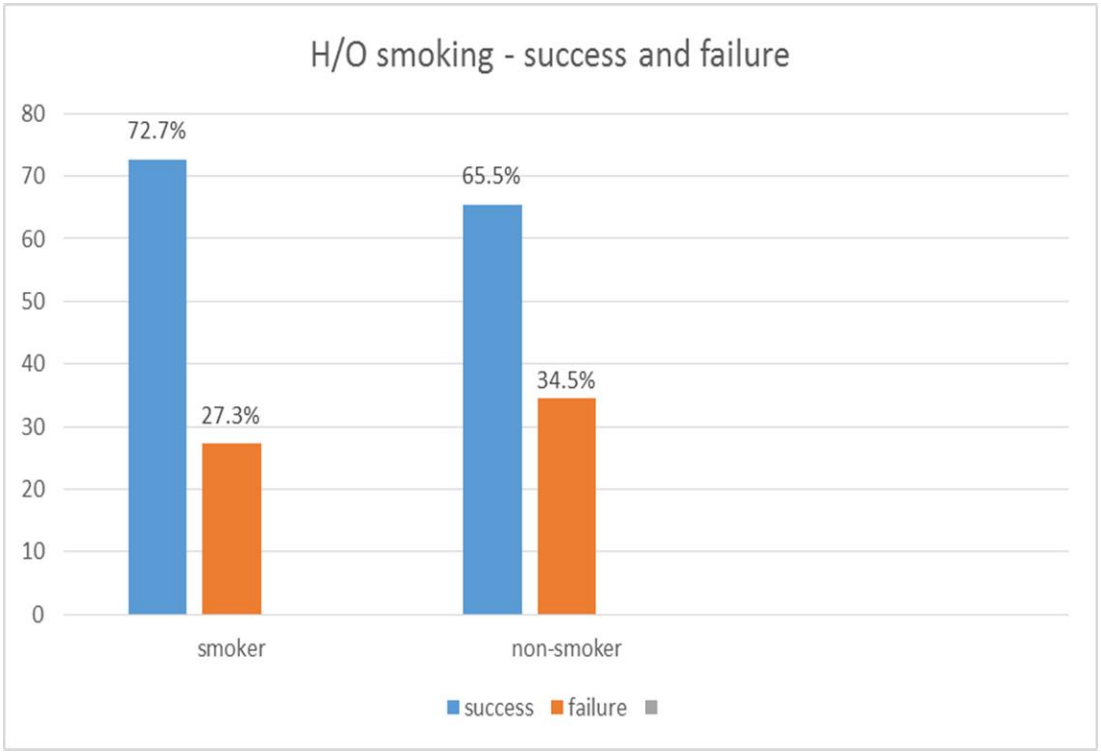


TABLE 5 : INFLUENCE OF SYSTEMIC HYPERTENSION ON SUCCESS OF THROMBOLYSIS

	Success			Failure		
	Number	Percentage within SHT	Percentage within result	Number	Percentage within SHT	Percentage within result
Systemic hypertension	12	60%	17.1%	8	40%	25%
Not a K/C/O Systemic hypertension	58	70.7%	82.9%	24	29.3%	75%

Pearson Chi – Square –

Value – 0.860

Df – 1

P = 0.354

Fisher's exact test = 0.252

Systemic Hypertension has no significant relation with the success of thrombolysis.

CHART 12 : SUCCESSFUL THROMBOLYSIS – H/O SHT

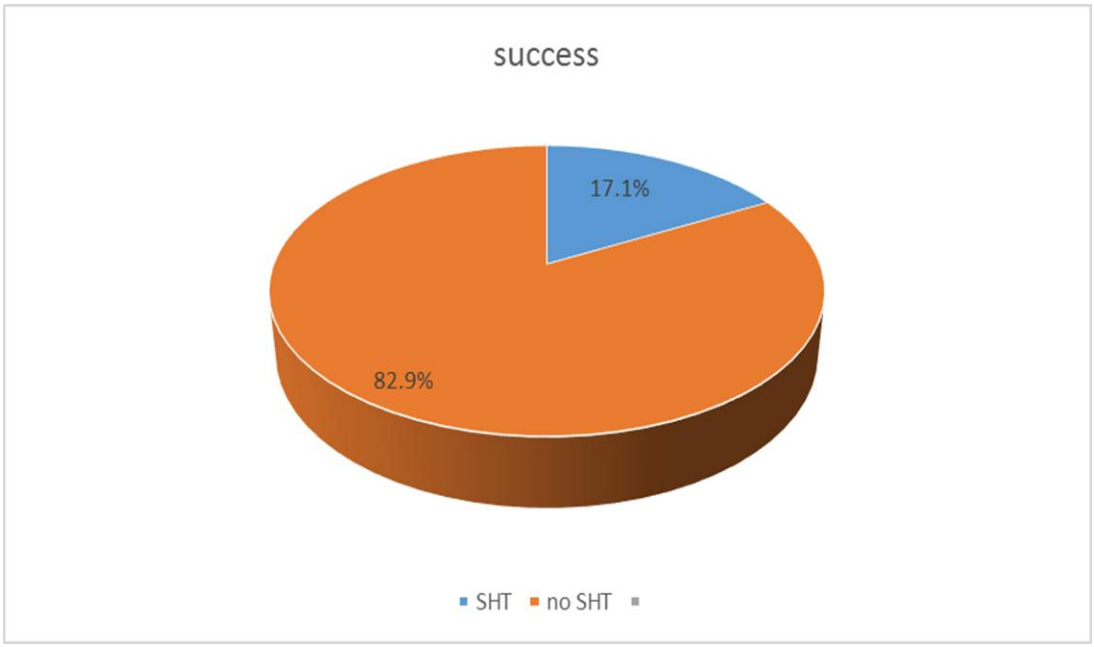


CHART 13 : H/O SHT WISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS

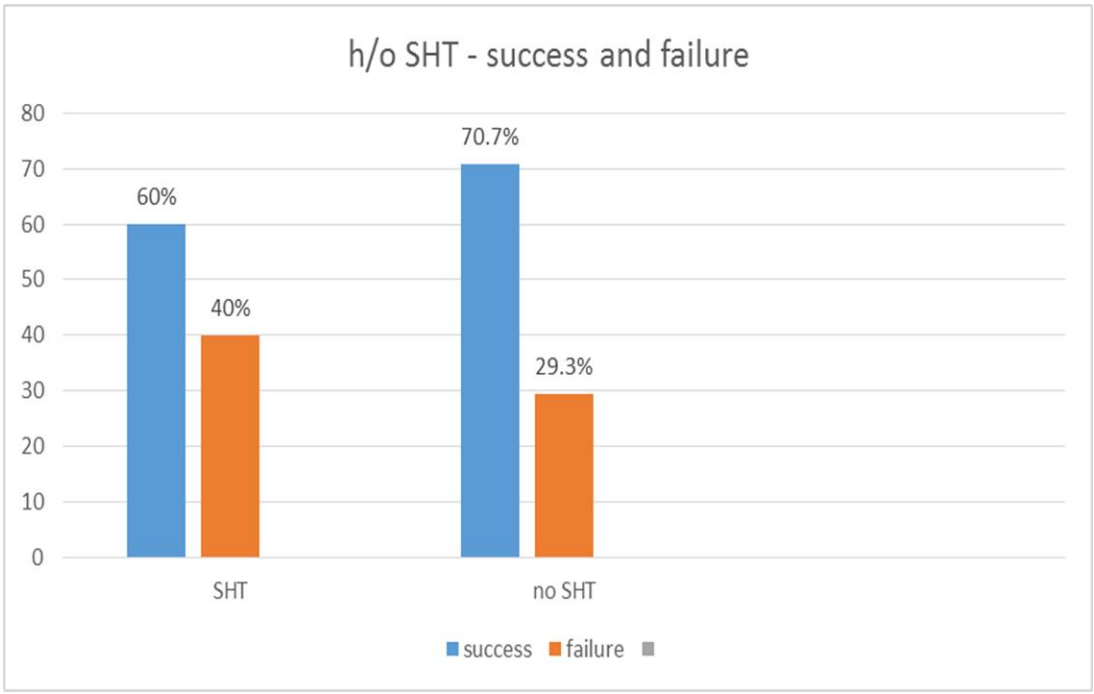


TABLE 6 : INFLUENCE OF DIABETES ON SUCCESS OF THROMBOLYSIS

	Success			Failure		
	Number	Percentage within DM	Percentage within result	Number	Percentage within DM	Percentage within result
H/O Diabetes	18	60%	25.7%	12	40%	37.5%
No H/O Diabetes	52	72.2%	74.3%	20	27.8%	62.5%

Pearson Chi – Square –

Value –1.469

Df – 1

P = 0.225

Fisher's exact test = 0.164

Diabetes has no significant relation with the success of thrombolysis.

CHART 14 : SUCCESSFUL THROMBOLYSIS – H/O DIABETES

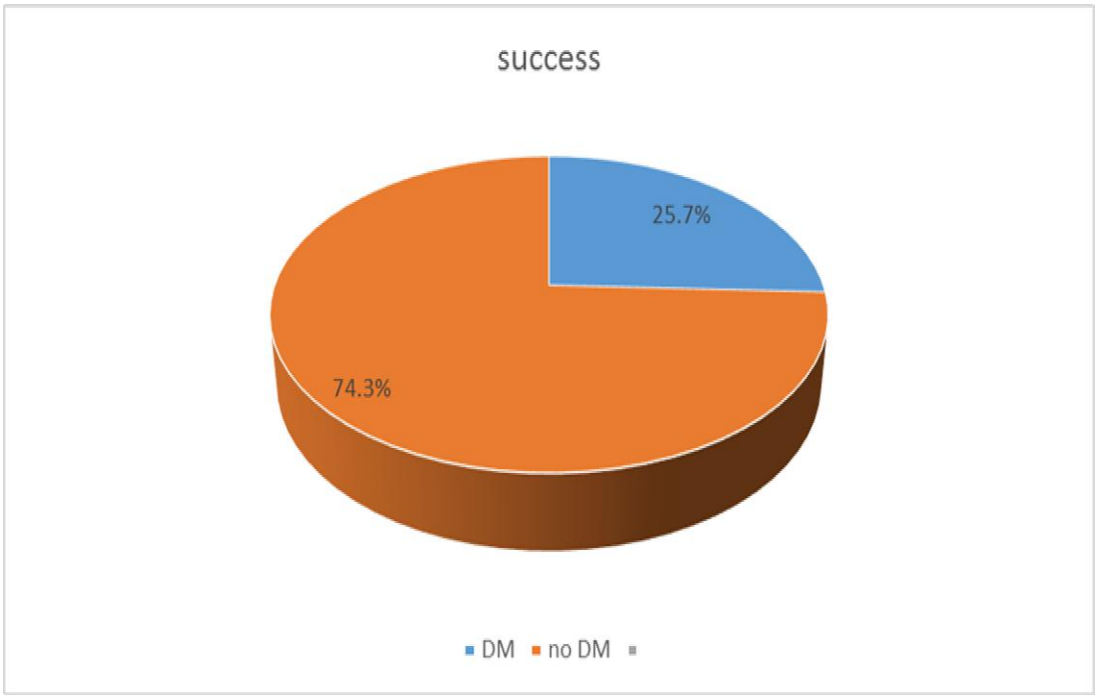


CHART 15 : H/O DIABETES WISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS

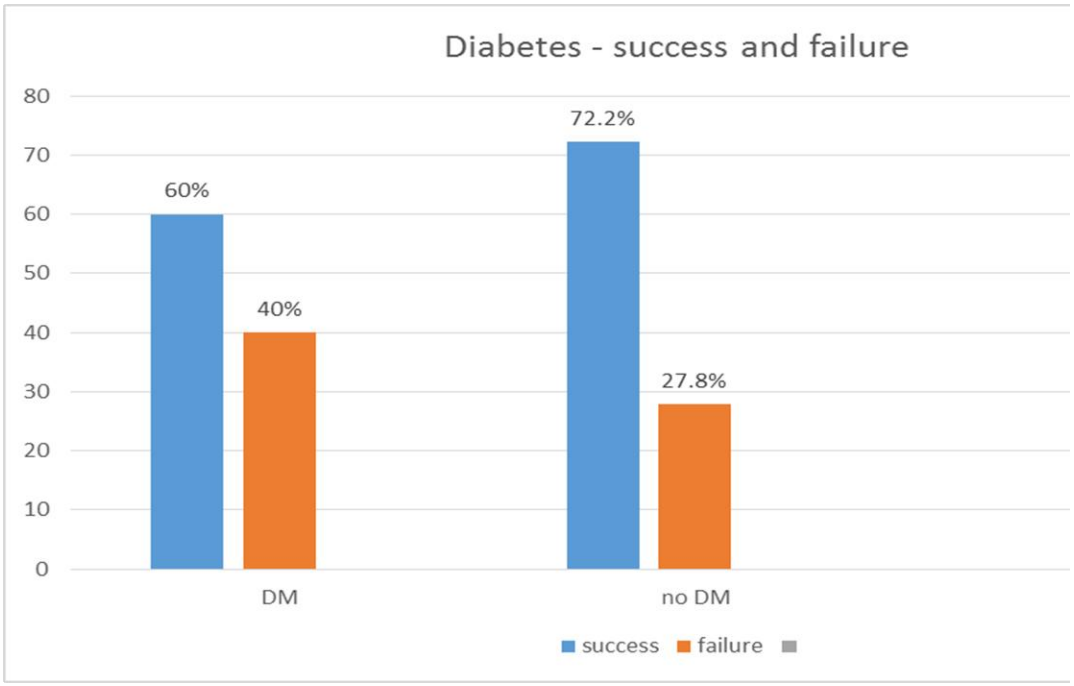


TABLE 7 : INFLUENCE OF WINDOW PERIOD ON SUCCESS OF THROMBOLYSIS

	Success			Failure		
	Number	Percentage within window period	Percentage within result	Number	Percentage within window period	Percentage within result
<3 hrs	36	83.7%	51.4%	7	16.3%	21.9%
3-6 hrs	24	64.9%	34.3%	13	35.1%	40.6%
>6hrs	10	45.5%	14.3%	12	54.5%	37.5%

Pearson Chi – Square –

Value – 10.280

Df – 2

P <0.05.

Window period from onset of pain to thrombolysis has significant relation with the success of thrombolysis.

CHART 16 : SUCCESSFUL THROMBOLYSIS – INFLUENCE OF WINDOW PERIOD

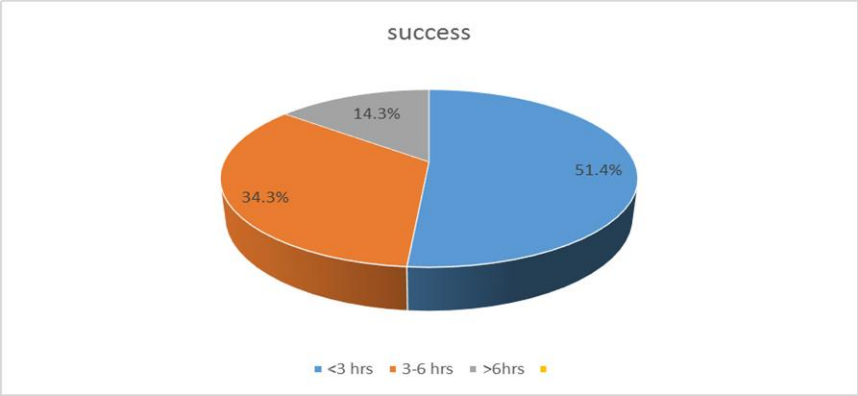


CHART 17 : INFLUENCE OF WINDOW PERIOD - THROMBOLYSIS FAILURE

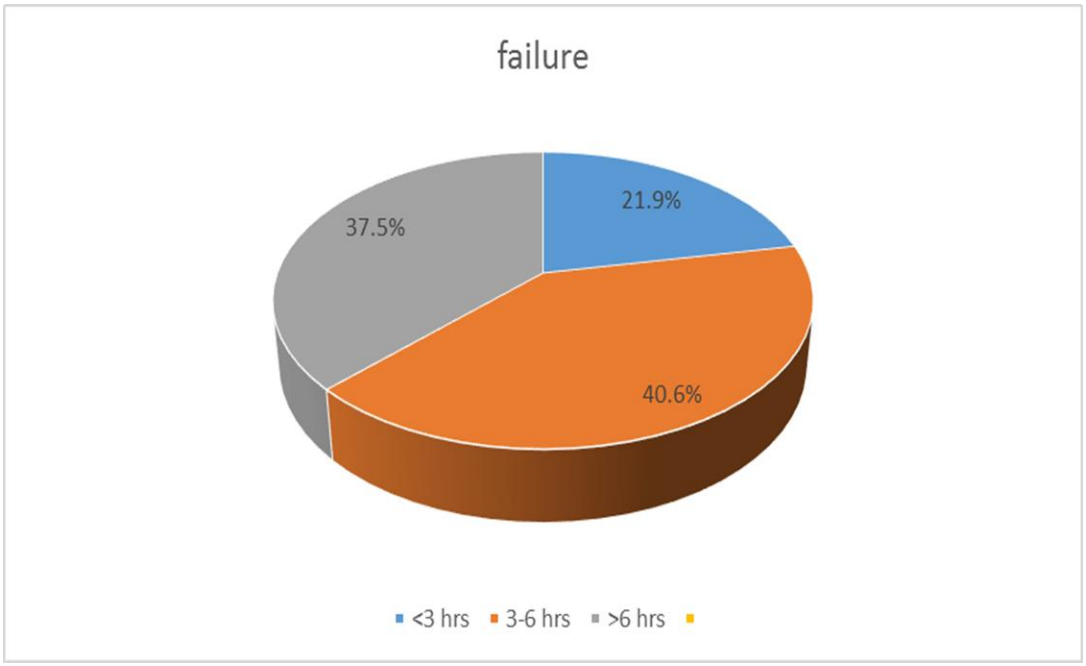


CHART 18 : WINDOW PERIOD WISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS

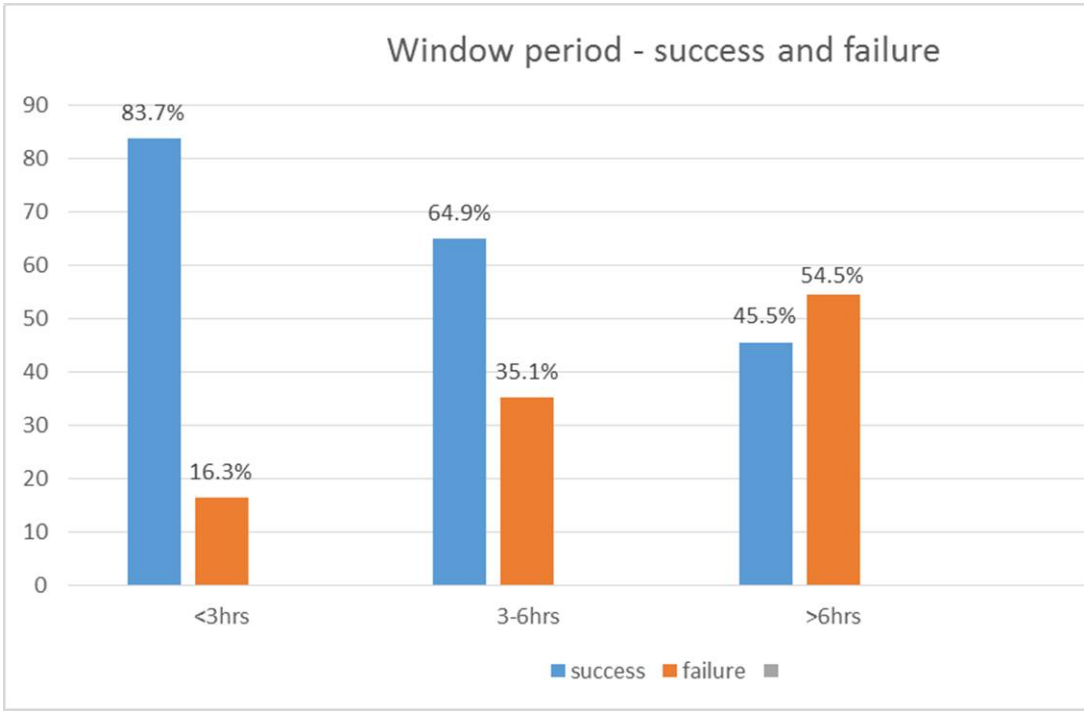


TABLE 8 : INFLUENCE OF CORONARY ARTERY ANATOMY ON SUCCESS OF THROMBOLYSIS

		Success			Failure		
		Number	Percentage within anatomy	Percentage within result	Number	Percentage within anatomy	Percentage within result
AWMI	Prox LAD	21	53.8%	30%	18	46.2%	56.2%
	Between S1 & D1	13	56.5%	18.6%	10	43.5%	31.2%
IWMI	Prox RCA	25	92.6%	35.7%	2	7.4%	6.2%
	Distal RCA	8	88.9%	11.4%	1	11.1%	3.1%
LWMI – LCX territory		2	100%	2.9%	0	0%	0%
Triple vessel disease		1	50%	1.4%	1	50%	3.1%

Pearson Chi – Square –

Value – 15.678

Df – 5

$P < 0.05$

Coronary artery anatomy has significant relation with the success of thrombolysis.

CHART 19 : THROMBOLYSIS FAILURE – ANATOMY WISE

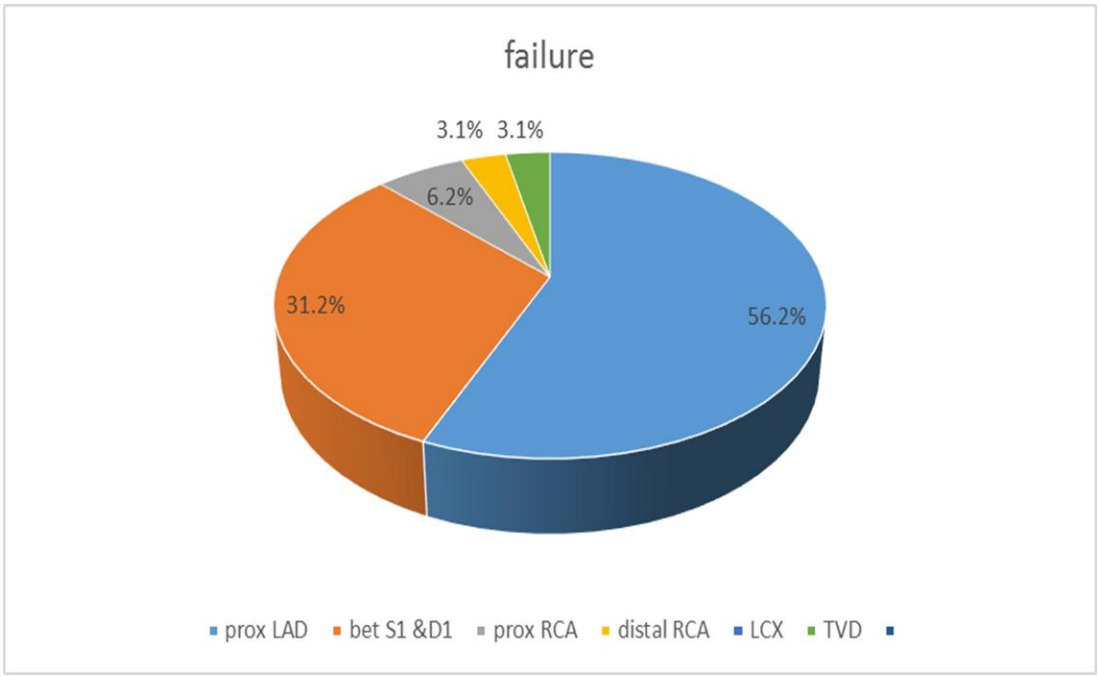


CHART 20 : ANATOMY WISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS

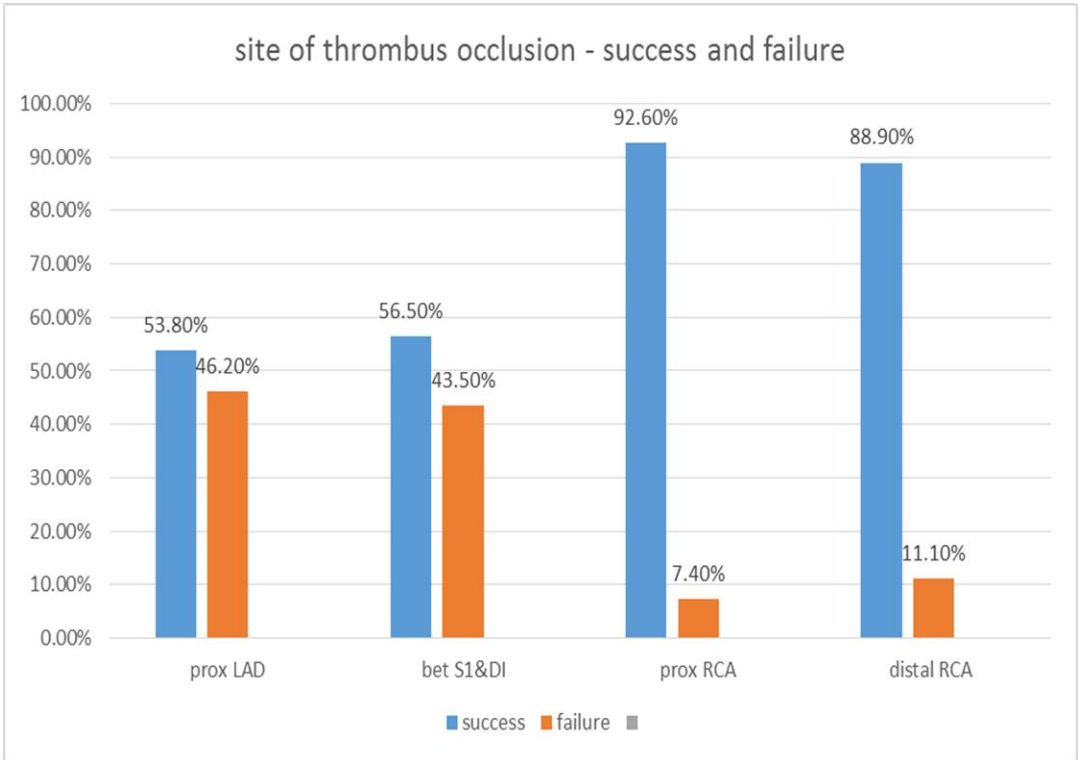


TABLE 9 : INFLUENCE OF KILLIP CLASSIFICATION ON SUCCESS OF THROMBOLYSIS

	Success			Failure		
	Number	Percentage within KC	Percentage within result	Number	Percentage within KC	Percentage within result
KC I	56	70.9%	80%	23	29.1%	71.9%
KC II	14	60.9%	20%	09	39.1%	28.1%

Pearson Chi – Square –

Value – 0.830

Df – 1

P = 0.362

Fisher's exact test = 0.253

Killip classification has no significant relation with the success of thrombolysis.

CHART 21 : THROMBOLYSIS FAILURE – KILLIP CLASSIFICATION WISE

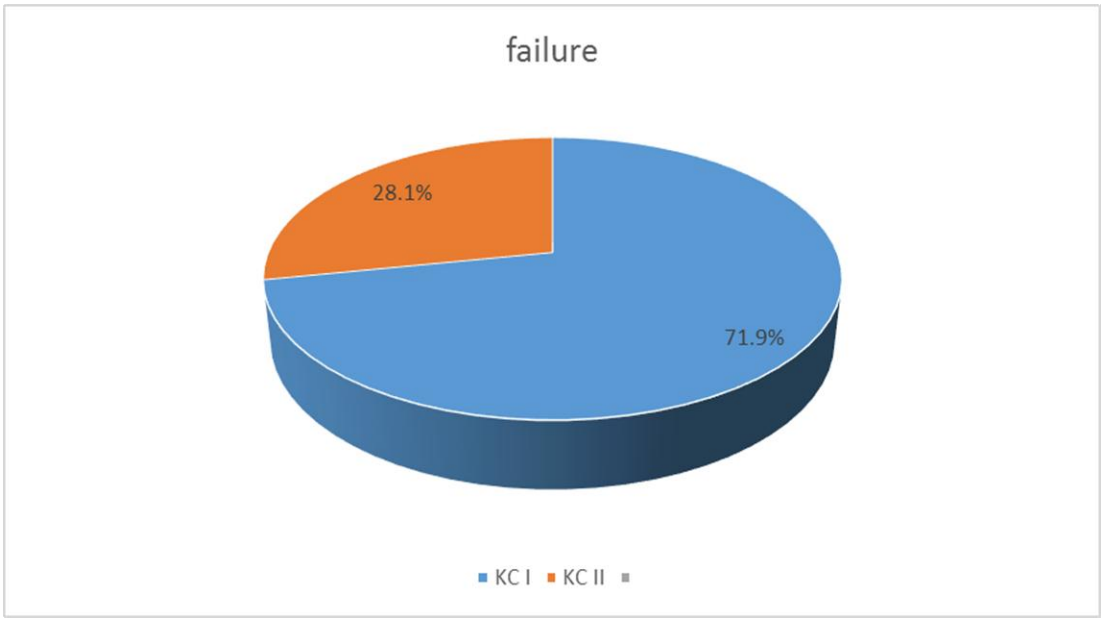
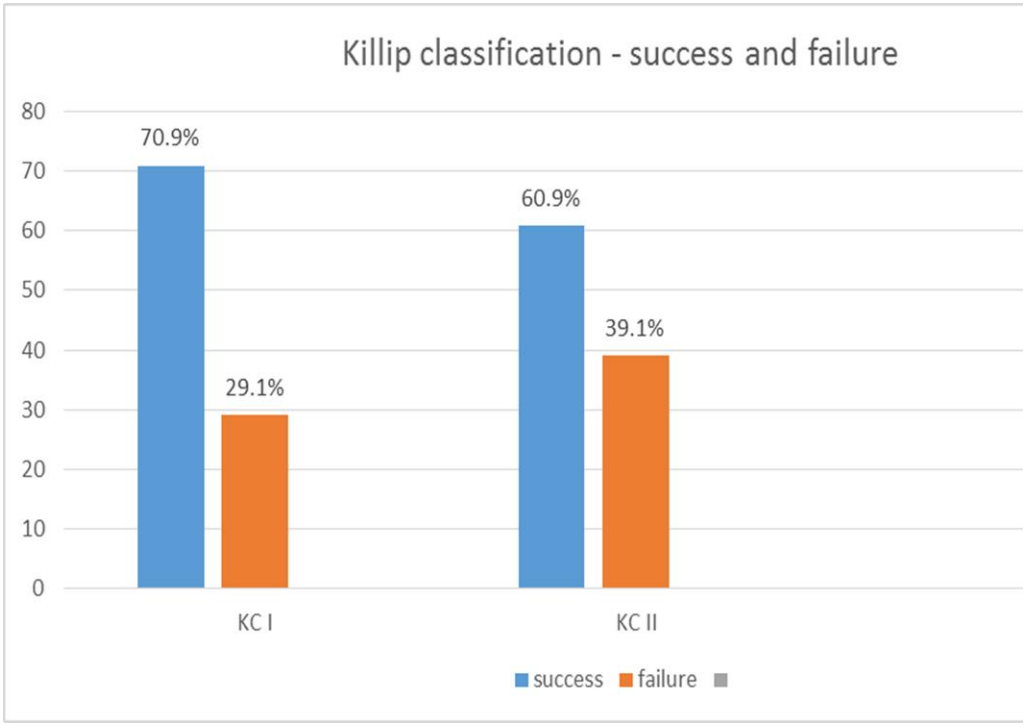


CHART 22 : KILLIP CLASSIFICATION WISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS



PART - B

INFLUENCE OF FACTORS ON THROMBOLYSIS IN STEMI PRESENTING WITHIN 3 HOURS:

TABLE 10 : INFLUENCE OF AGE ON SUCCESS OF THROMBOLYSIS: PRESENTATION < 3 HRS

	Success			Failure		
	Number	Percentage within age	Percentage within result	Number	Percentage within age	Percentage within result
< 40 yrs	9	81.8%	25%	2	18.2%	28.6%
40 – 60 yrs	21	91.3%	58.3%	2	8.7%	28.6%
>60 yrs	6	66.7%	16.7%	3	33.3%	42.8%

Pearson Chi – Square : P = 0.232

Age has no significant relation with the success of thrombolysis in cases presenting within window period of 3 hrs.

CHART 23 : AGEWISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS : WINDOW PERIOD < 3 HRS

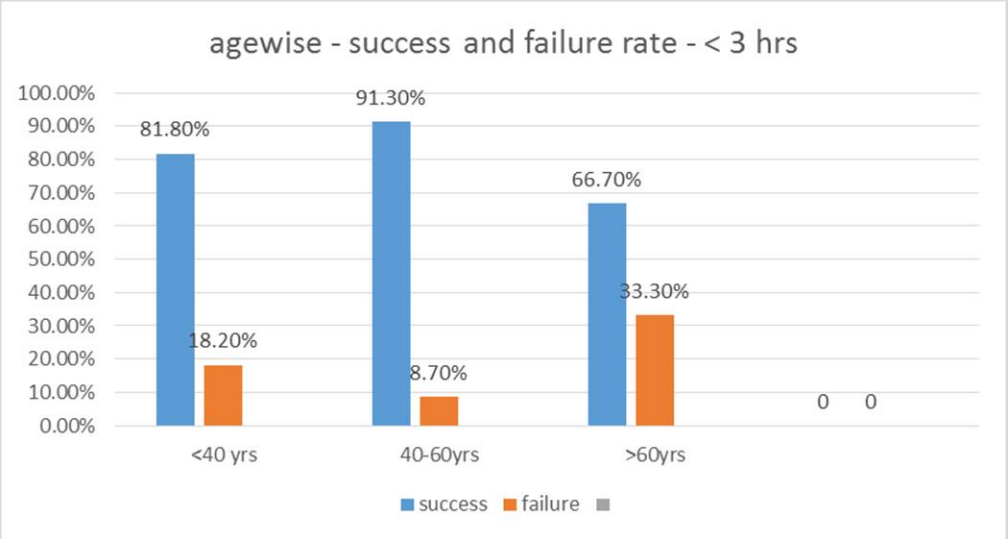


TABLE 11 : INFLUENCE OF SEX ON SUCCESS OF THROMBOLYSIS : PRESENTATION < 3 HRS

	Success			Failure		
	Number	Percentage within sex	Percentage within result	Number	Percentage within sex	Percentage within result
Male	27	81.8%	75%	6	18.2%	85.7%
Female	9	90%	25%	1	10%	14.3%

Pearson Chi – Square : P = 0.476 .

Sex has no significant relation with the success of thrombolysis in cases presenting within window period of 3 hrs.

CHART 24 : SEXWISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS : WINDOW PERIOD < 3 HRS

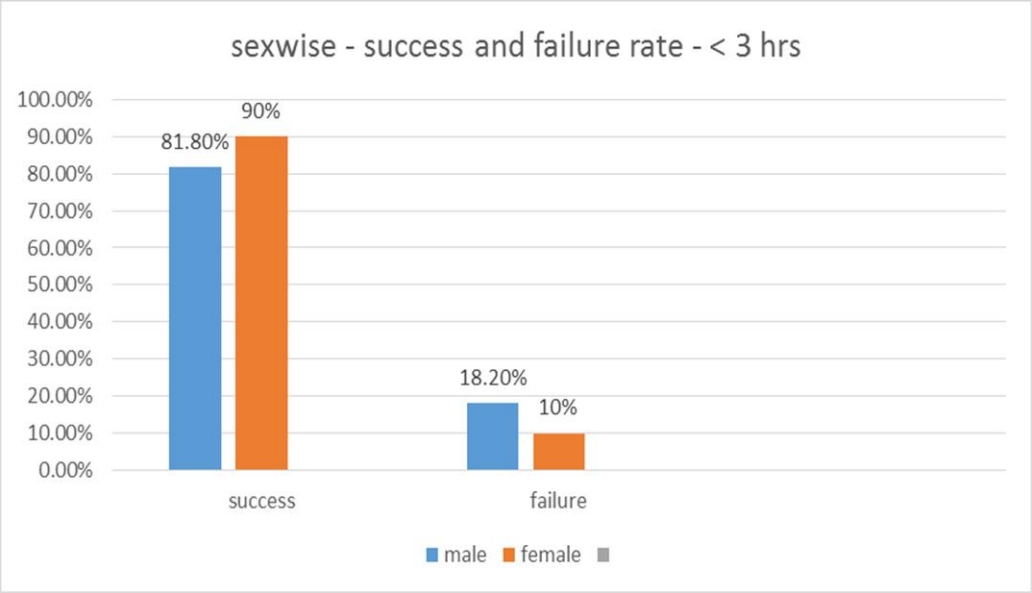


TABLE 12 : INFLUENCE OF LIFESTYLE ON SUCCESS OF THROMBOLYSIS : PRESENTATION < 3 HRS

	Success			Failure		
	Number	Percentage within lifestyle	Percentage within result	Number	Percentage within lifestyle	Percentage within result
Sedentary	12	85.7%	33.3%	2	14.3%	28.6%
Active	24	82.8%	66.7%	5	17.2%	71.4%

Pearson Chi – Square: (Fisher's Exact test) P = 0.590 .

Lifestyle has no significant relation with the success of thrombolysis in cases presenting within window period of 3 hrs.

CHART 25 : LIFESTYLEWISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS : WINDOW PERIOD < 3 HRS

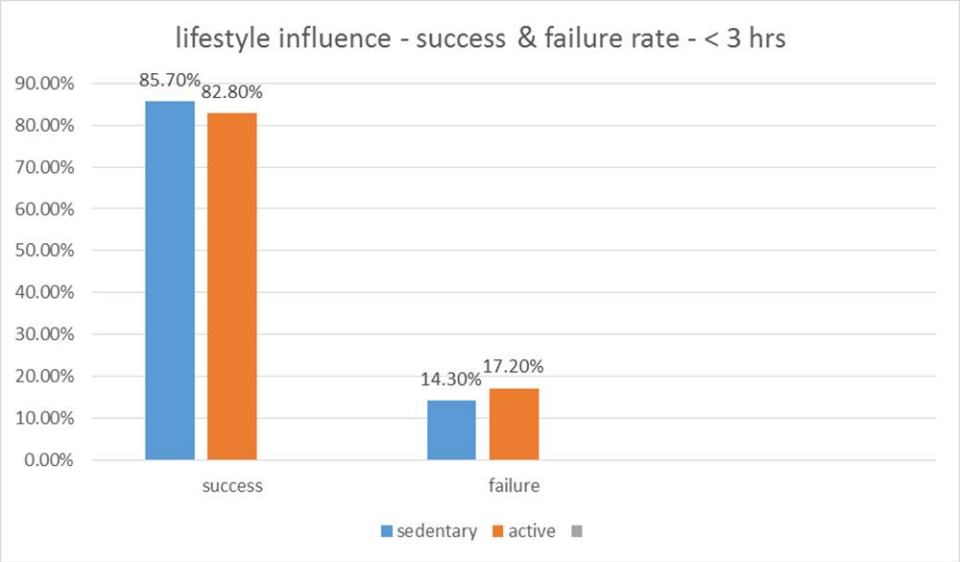


TABLE 13 : INFLUENCE OF SMOKING ON SUCCESS OF THROMBOLYSIS : PRESENTATION < 3 HRS

	Success			Failure		
	Number	Percentage within smokers	Percentage within results	Number	Percentage within smokers	Percentage within results
Smokers	14	93.3%	38.9%	1	6.7%	14.3%
Non-smokers	22	78.6%	61.1%	6	21.4%	85.7%

Pearson Chi – Square : (Fisher's Exact test) P = 0.212 .

Smoking has no significant relation with the success of thrombolysis in cases presenting within window period of 3 hrs.

CHART 26 : INFLUENCE OF SMOKING ON DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS : WINDOW PERIOD < 3 HRS

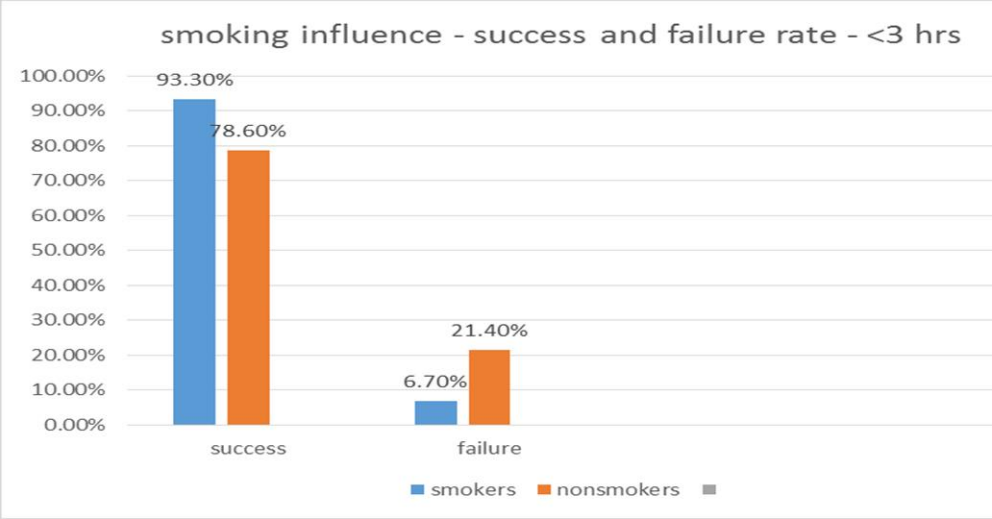


TABLE 14 : INFLUENCE OF SYSTEMIC HYPERTENSION ON SUCCESS OF THROMBOLYSIS : PRESENTATION < 3 HRS

	Success			Failure		
	Number	Percentage within SHT	Percentage within result	Number	Percentage within SHT	Percentage within result
SHT	5	71.4%	13.9%	2	28.6%	28.6%
No – SHT	31	86.1%	86.1%	5	13.9%	71.4%

Pearson Chi – Square (Fisher's exact test) : P = 0.318.

Systemic hypertension has no significant relation with the success of thrombolysis in cases presenting within window period of 3 hrs.

CHART 27 : INFLUENCE OF SHT ON DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS : WINDOW PERIOD < 3 HRS

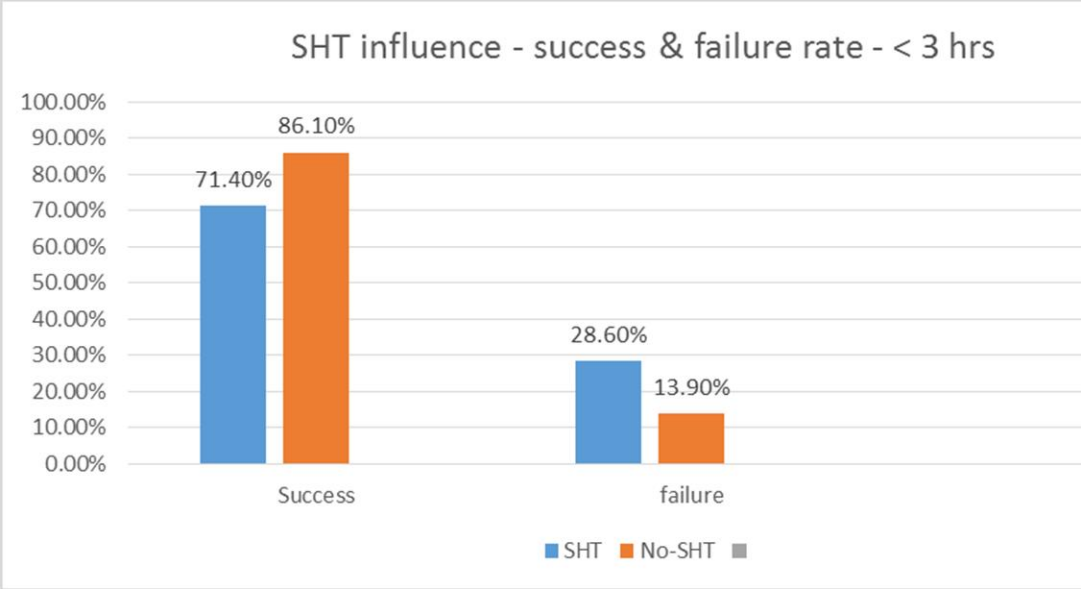


TABLE 15 : INFLUENCE OF DIABETES ON SUCCESS OF THROMBOLYSIS : PRESENTATION < 3 HRS

	Success			Failure		
	Number	Percentage within diabetes	Percentage within result	Number	Percentage within diabetes	Percentage within result
Diabetic	8	66.7%	22.2%	4	33.3%	57.1%
Non-diabetic	28	90.3%	77.8%	3	9.7%	42.9%

Pearson Chi – Square (Fisher's exact test) : P = 0.081.

Diabetes has comparatively some significant relation with the success of thrombolysis in cases presenting within window period of 3 hrs.

CHART 28 : INFLUENCE OF H/O DIABETES ON DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS: WINDOW PERIOD < 3 HRS

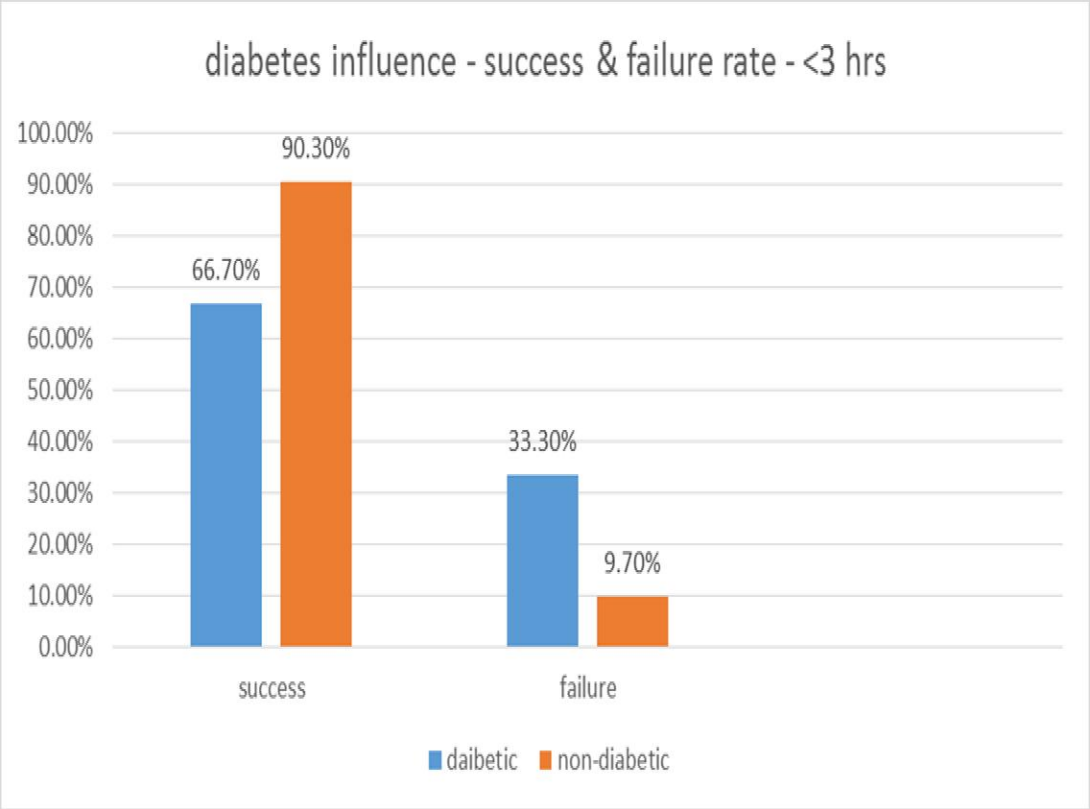


TABLE 16 : INFLUENCE OF CORONARY ARTERY ANATOMY ON SUCCESS OF THROMBOLYSIS : PRESENTATION < 3 HRS

		Success			Failure		
		Number	Percentage within anatomy	Percentage within result	Number	Percentage within anatomy	Percentage within result
LAD	Prox LAD	10	76.9%	27.8%	3	23.1%	42.9%
	Between S1 & D1	6	60%	16.7%	4	40%	57.1%
RCA	Prox RCA	12	100%	33.3%	0	0%	0%
	Distal RCA	6	100%	16.7%	0	0%	0%
LCX		1	100%	2.8%	0	0%	0%
TVD		1	100%	2.8%	0	0%	0%

Pearson Chi – Square : P = 0.051.

Coronary artery anatomy has significant relation with the success of thrombolysis in cases presenting within window period of 3 hrs.

CHART 29 : ANATOMY - WISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS : WINDOW PERIOD < 3 HRS

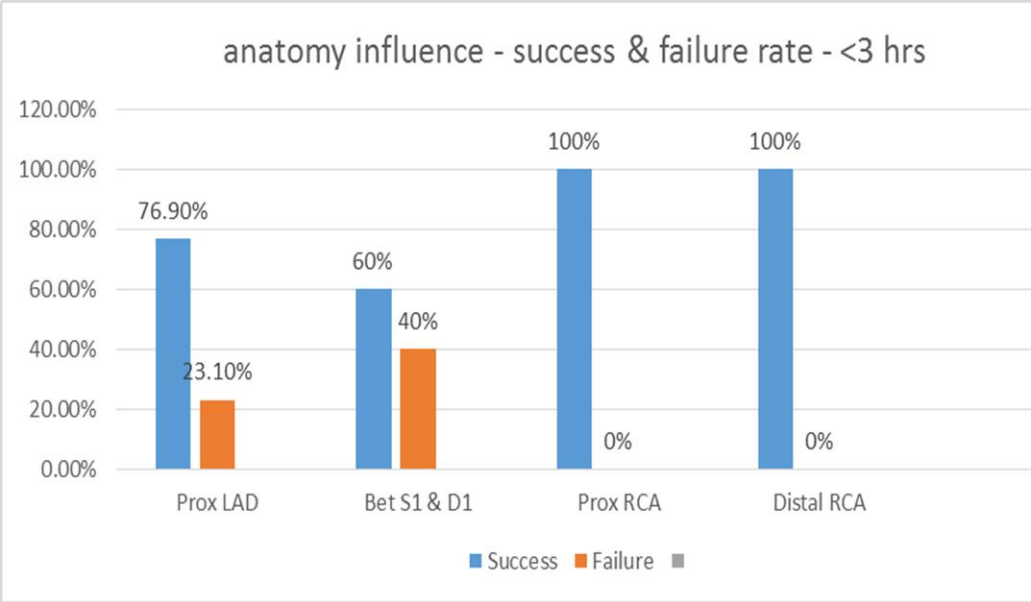


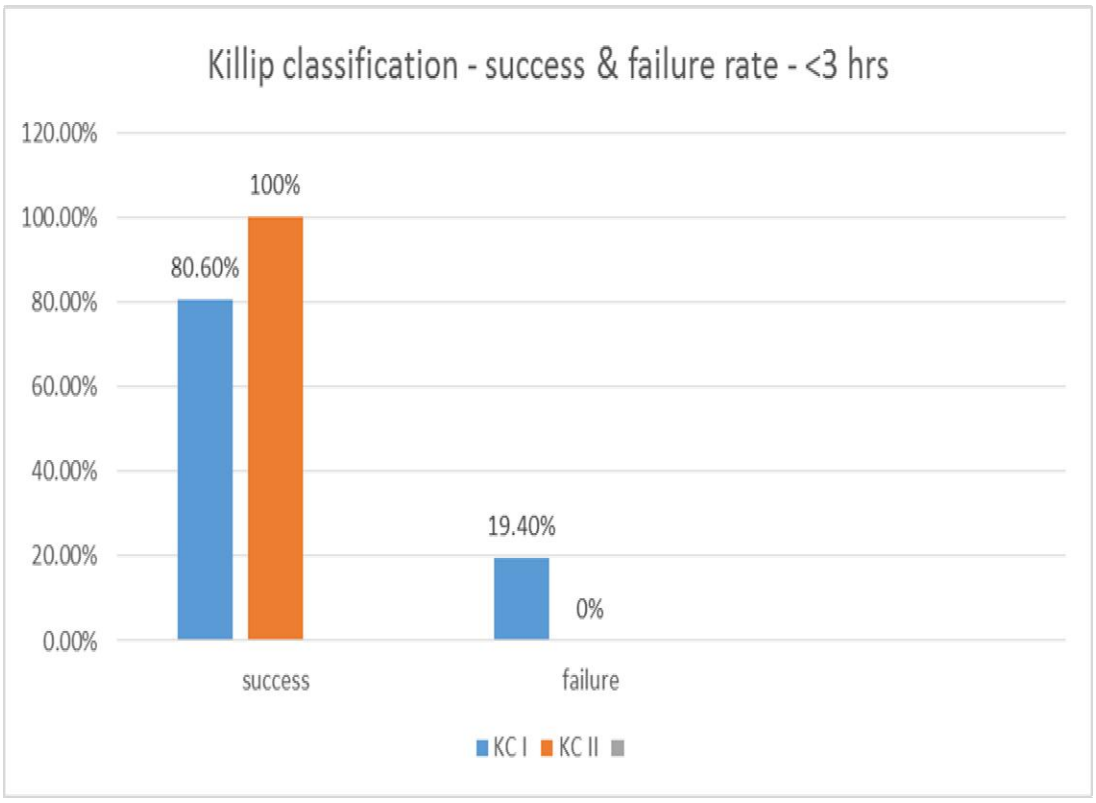
TABLE 17 : INFLUENCE OF KILLIP CLASSIFICATION ON SUCCESS OF THROMBOLYSIS : PRESENTATION < 3 HRS

	Success			Failure		
	Number	Percentage within KC	Percentage within result	Number	Percentage within KC	Percentage within result
KC I	29	80.6%	80.6%	7	19.4%	100%
KC II	7	100%	19.4%	0	0%	0%

Pearson Chi – Square (Fisher's exact test) : P = 0.259 .

Killip classification has no significant relation with the success of thrombolysis in cases presenting within window period of 3 hrs.

CHART 30 : KILLIP CLASSIFICATION-WISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS : WINDOW PERIOD < 3 HRS



PART - C

OTHER IMPORTANT FINDINGS OF SIGNIFICANCE IN THE STUDY:

TABLE 18 : INFLUENCE OF SEX ON SUCCESS OF THROMBOLYSIS : PRESENTATION >6 HRS

	Success			Failure		
	Number	Percentage within sex	Percentage within result	Number	Percentage within sex	Percentage within result
Male	4	28.6%	40%	10	71.4%	83.3%
Female	6	75%	60%	2	25%	16.7%

Pearson Chi – Square (Fisher's exact test) : $P < 0.05$.

Sex has significant relation with the success of thrombolysis in cases presenting within window period of > 6 hrs .

CHART 31 : SEXWISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS : WINDOW PERIOD >6 HRS

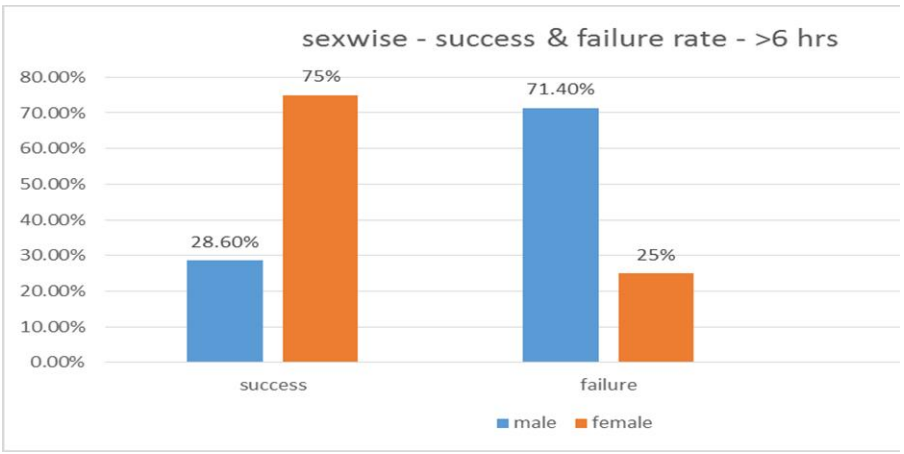


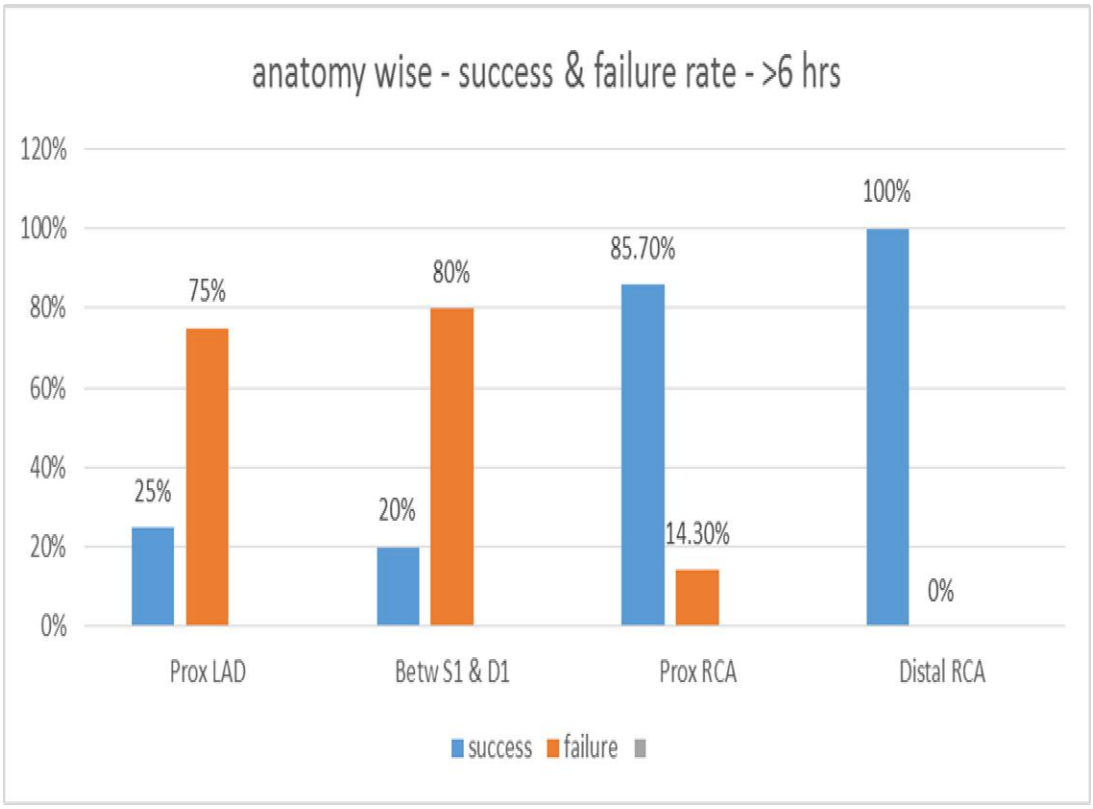
TABLE 19 : INFLUENCE OF CORONARY ARTERY ANATOMY ON SUCCESS OF THROMBOLYSIS : PRESENTATION >6 HRS

		Success			Failure		
		Number	Percentage within anatomy	Percentage within result	Number	Percentage within anatomy	Percentage within result
LAD	Prox LAD	2	25%	20%	6	75%	50%
	Between S1 & D1	1	20%	10%	4	80%	33.3%
RCA	Prox RCA	6	85.7%	60%	1	14.3%	8.3%
	Distal RCA	1	100%	10%	0	0%	0%
LCX		0	0%	0%	0	0%	0%
TVD		0	0%	0%	1	100%	8.3%

Pearson Chi – Square : P = 0.05.

Coronary artery anatomy has significant relation with the success of thrombolysis in cases presenting within window period of >6 hrs.

CHART 32: ANATOMYWISE DISTRIBUTION OF SUCCESSFUL AND UNSUCCESSFUL THROMBOLYSIS : WINDOW PERIOD >6 HRS



DISCUSSION

On analyzing the data of 102 patients thrombolysed in the time period of one year (June 2014 – May 2015) in intensive care unit of Chengalpattu government college and hospital, it was found that 70 patients (68.6%) were successfully thrombolysed while 32 patients (31.4%) had a failure in thrombolysis using Inj. Streptokinase as thrombolysing agent. The influence of various factors on thrombolysis were analysed.

A similar study on "factors affecting thrombolysis in myocardial infarction myocardial perfusion frame count: insights of myocardial tissue-level reperfusion from a novel index for assessing myocardial perfusion" was conducted by Pu J, Shan PR and co. A total of 255 consecutive STEMI patients undergoing thrombolysis were enrolled. 1 Advanced age, 2 diabetes, 3 higher Killip class, and 4 longer ischemia time were independent predictors of impaired TMPFC after thrombolysis.

A similar study "Original research Factors influencing the outcome of thrombolysis in acute myocardial infarction" was done by DrGirishRonad et al at, Department of General Medicine, ESIC Medical College, Gulbarga from October 2011 to October 2013. A total of 100 patients were included in the study. All patients were evaluated in detail and followed until discharge from the hospital. Results were that the overall success rate of thrombolysis was 65%. Time window period, that is those presenting within 0-4 hrs of symptom onset had higher

success rate compared to those presenting later ($P<0.01$). Location of MI that is those with inferior wall infarctions had higher success rate compared to anterior wall ($P<0.05$). Patients presenting with higher Killips had high failure rate ($P<0.05$). Diabetics, hypertensives, smokers and alcoholics did not differ statistically compared to non diabetics, non hypertensives, non smokers and non alcoholics respectively with $P>0.05$. Streptokinase/ tenecteplase did not differ in their outcome statistically ($P>0.05$).

PART - A

Influence of age on thrombolysis :

In our study, of the 102 patients thrombolysed, 18 were < 40 yrs of age, 56 were in the age group between 40 to 60 years and 28 were > 60 years of age. The success rate of thrombolysis in the age group <40 years, 40 – 60 years and > 60 years were found to be 66.7% , 76.8% and 53.6% respectively and the failure rate among those thrombolysed in the age group < 40 years, 40 – 60 years and > 60 years were found to be 33.3%, 23.2 % and 46.4% respectively. Success rate was found to be comparatively better for those aged < 60 years. But on statistical analysis, there was no significant relationship between age distribution and result of thrombolysis using Inj. Streptokinase. ($p = 0.248$) .

A Study on " Acute Coronary Syndrome In Elderly – The Difference, Compared With Young In Intensive Care Unit Of A Tertiary Hospital "In Western Nepal was done on patients admitted to ICU in the "Manipal Teaching Hospital "in the month of "March 2006 to June 2007". Out of 153 patients were analyzed - elderly patients (> 65 yrs) constituted 51% (78) of the study population. The success rate of thrombolysis was lower in elderly patients (50%) as compared to young patients (76.9%). The end result of the study was elderly patients are more prone to complications have less success rate for thrombolysis and have a higher mortality rate when compared to young patients.

Influence of sex on thrombolysis :

In our study, of the 102 patients thrombolysed, 77 were male and 25 were female. The success rate of thrombolysis among males and females were found to be 67.5% and 72% respectively and the failure rate of thrombolysis among males and females were found to be 32.5% and 28% respectively. Hence there was no much difference on the success and failure rates among males and females. No significant statistical relationship could be found on the influence of sex on thrombolysis using Inj. Streptokinase ($p = 0.676$).

A study "Gender and acute myocardial infarction: is there a different response to thrombolysis?" was conducted by Woodfield SL1, Lundergan CF and co. Patency rates and global and regional left ventricular function were determined in patients at "90 min" and "5 to 7 days" after thrombolytic therapy for acuteMI. The results "ninety-minute post thrombolysis" in women and men were 39% and 38%, respectively ($p = 0.5$). Women had more recurrent ischemia than men. The conclusion of the study was women do not differ significantly from men with regard to early infarct-related artery patency rates. Gender was a factor independent of the success and failure rate of thrombolysis.

Influence of lifestyle on thrombolysis :

In our study, of the 102 patients thrombolysed, 47 were leading a sedentary lifestyle and 55 were active or leading a non-sedentary lifestyle. The success and failure rate of thrombolysis among those with sedentary lifestyle were found to be 61.7% and 38.3% respectively and the success and failure

rate of thrombolysis among those with non-sedentary or active lifestyle were found to be 74.5% and 25.5% respectively. Hence success rate was to be comparatively higher among those with a non-sedentary lifestyle or an active lifestyle when compared to a sedentary lifestyle. However on statistical analysis, there was no significant relationship between lifestyle of the patients and result of thrombolysis using Inj. Streptokinase ($p = 0.163$).

Influence of smoking on thrombolysis (Smoking paradox ?):

In our study, of the 102 patients thrombolysed, 44 were smokers and 58 were non-smokers. The success and failure rate of thrombolysis among smokers were found to be 72.7% and 27.3% respectively and the success and failure rate of thrombolysis among non-smokers were found to be 65.5% and 34.5% respectively. Among the failure cases, 62.5% were non-smokers and 37.5% were smokers. Hence smokers had a slightly higher success rate of thrombolysis when compared to the non-smokers. But on statistical analysis ,there was no significant relationship between history of smoking among the patients and result of thrombolysis using Inj. Streptokinase ($p = 0.288$).

A study “Lower cardiac mortality in smokers following thrombolysis for acute myocardial infarction may be related to more effective fibrinolysis”. Of the 332 patients with AMI, 48% were current smokers, 19% previous smokers and 33% had never smoked. Results were a successful thrombolysis (by 60 mins) was achieved by “44%” of current smokers compared with 43% of non-smokers. Unsuccessful thrombolysis (by 180 min) was seen in “35%” of non-smokers as compared to “16%” of current smokers ($p<0.05$). The

conclusion of the study was cigarette smoking was associated with lower short-term cardiac mortality in patients receiving thrombolysis for AMI.

But insignificant."CindyL. Gines, E.J. Topolet al.14" reported similar patency rates in smokers and nonsmokers at 90 minutes (73% versus 74%).

The term "smoker's paradox" was introduced into scientific discourse more than 25 years ago following observations that smokers (in comparison to non-smokers) experience decreased mortality following an acute myocardial infarction (AMI). In recent studies, it is shown that " Smokers paradox" is not seen in those undergoing PCI.

The "International Tissue Plasminogen Activator/Streptokinase Mortality Trial" shows "smoker's paradox" and GISSI-2 trial showed only a non-significant trend for better outcome for smokers. These two studies bring forward the problem of the classification of former smokers.

In the "GUSTO-1" study, 40,599 patients were included to analyse 30-day mortality in relation to smoking. Smokers paradox was first coined in this study. The "smoker's paradox" was predominantly observed in AMI patients selected according to the "WHO criteria" of the 1980s and 1990s during which time fibrinolysis was the dominant reperfusion strategy for AMI patients.

Influence of systemic hypertension on thrombolysis :

In our study, of the 102 patients thrombolysed, 20 were hypertensives on medications and 82 were non-hypertensives. The success and failure rate of thrombolysis among hypertensives were found to be 60% and 40%

respectively and the success and failure rate of thrombolysis among non-hypertensives were found to be 70.7% and 29.3% respectively. On statistical analysis, there was no significant relationship between hypertension and result of thrombolysis using Inj.Streptokinase (p = 0.354)

A similar study "Original research Factors influencing the outcome of thrombolysis in acute myocardial infarction" was done by DrGirishRonad et al at, Department of General Medicine, ESIC Medical College, Gulbarga from October 2011 to October 2013. A total of 100 patients were included in the study. The success rate of thrombolysis was not found to be different among hypertensive/non hypertensive patients . Among the 30 hypertensives, 21 were thrombolysed successfully and among the 70 non-hypertensives, 44 were thrombolysed successfully. p value was 0.47 i.e. insignificant.

A trial was conducted where a total of (373 patients (177 of whom had antecedent hypertension) were treated by thrombolysis because of STEMI. All parameters were compared between the patients with and without hypertension. It was shown that hypertensive patients who received thrombolysis had higher rates of in-hospital mortality and major adverse cardiac events than patients without hypertension.

Influence of diabetes on thrombolysis:

In our study, of the 102 patients thrombolysed, 30 were diabetic and 72 were non-diabetic. The success and failure rate of thrombolysis among diabetics were found to be 60% and 40% respectively and the success and

failure rate of thrombolysis among non-diabetics were found to be 72.2% and 27.8% respectively. On statistical analysis, there was no significant relationship between diabetes and result of thrombolysis using Inj.Streptokinase (p = 0.225)

But at a similar study “Original research Factors influencing the outcome of thrombolysis in acute myocardial infarction “was done by DrGirishRonad et al at, Department of General Medicine, ESIC Medical College, Gulbarga from October 2011 to October 2013 where a total of 100 patients were included in the study, the success rate of thrombolysis was not found to be different among diabetic and non-diabetic patients (p = 0.38).

A similar study “A comparative study on the effect of streptokinase between diabetic and non-diabetic myocardial infarction patients” was conducted by Md. Anup Rahman Chowdhury et al . Off the 187 study subjects with acute MI admitted at CCU, “126” patients were non-diabetic and” 61 “patients were diabetic. Streptokinase was administered to all patients. Resolution (reduction) of “elevated ST segment was evaluated after 90 minutes of streptokinase administration. “Successful thrombolysis” (≤70% ST-resolution) was significantly higher in non-diabetic than diabetic ($p<0.001$), while “unsuccessful thrombolysis” (<30% ST resolution) was significantly higher in diabetic patients ($p<0.001$). It was concluded that diabetes mellitus might affect the thrombolytic outcome of acute MI in patients with diabetes mellitus.

Influence of window period on thrombolysis:

In our study, of the 102 patients thrombolysed, 43 patients were thrombolysed within 3 hours, 37 patients between 3 to 6 hours and 22 patients in more than 6 hours (till 12 hours). The success and failure rate of thrombolysis within 3 hours were found to be 83.7% and 16.3% respectively, the success and failure rate of thrombolysis between 3 to 6 hours were found to be 64.9% and 39.1% respectively and the success and failure rate of thrombolysis in more than 6 hours (< 12 hours) were found to be 45.5% and 54.5% respectively. On statistical analysis, there was significant relationship between window period and result of thrombolysis using Inj.Streptokinase ($p < 0.05$) . Success rate of thrombolysis is found to be greater for the patients thombolysed within 3 hours (83.7%), decreased to 64.9% in those between 3 to 6 hours and further decreased to 45.5% in those thrombolysed in more than 6 hours.

At the GISSI trial, the initial report changed the outlook of physicists all over the world regarding thrombolytic therapy for STEMI. Around 11,806 patients from 176 coronary care units in different hospitals were included during a period of 17 months (February 1984 to June 1985) for the study. The results showed patients had higher chance of survival if the time was shorter between the symptom onset and the streptokinase infusion.

A similar study "Original research Factors influencing the outcome of thrombolysis in acute myocardial infarction "was done by DrGirishRonad et al at, Department of General Medicine, ESIC Medical College, Gulbarga from October 2011 to October 2013. A total of 100

patients were included in the study. In this study also it is evident. Success rate was 80% in those patients thrombolysed within 4 hours from the onset of symptoms. The success rate decreased to 61.7%, when they were thrombolysed after 4 hrs but within 8 hours of onset of symptoms. Success rate came down to 30.7%, when STK/ TNK was administered after 8 hours but within 12 hours ($p < 0.01$).

Influence of localization of thrombus in coronary artery on thrombolysis:

In our study , of the 102 patients thrombolysed, 39 had occlusion at proximal LAD, 23 in between D1 and S1 branches of LAD, 27 in proximal RCA, 9 in distal RCA, 2 in LCX and 2 patients had triple vessel disease. The success and failure rate of thrombolysis in those who had occlusion in proximal LAD were found to be 53.8% and 46.2% respectively, between D1 and S1 branches of LAD were found to be 56.5% and 43.5% respectively , in proximal RCA 92.6% and 7.4% respectively, in distal RCA 88.9% and 11.1% respectively and in LCX 100% and 0% respectively and in triple vessel disease were found to be 50% and 50% respectively. The success rate was found to be higher for those who had occlusion in Right coronary artery than in any other vessel. On statistical analysis, there was significant relationship between localization of occlusion in coronary artery and result of thrombolysis using Inj.Streptokinase ($p < 0.05$) .

A Study “Predictors of inhospital outcome after acute inferior wall myocardial infarction” was conducted by “Jim MH1, Chan AO, Tse HF, Lau CP et al”. From January 1997 to March 2006, around 546 patients suffering from their first inferior wall myocardial infarction were included in the study.

On comparing results with AWMI, IWMI is generally regarded as being low risk and had better rate of success in thrombolysis .

A similar study “Original research Factors influencing the outcome of thrombolysis in acute myocardial infarction “was done by DrGirishRonad et al at , Department of General Medicine, ESIC Medical College, Gulbarga from October 2011 to October 2013. A total of 100 patients were included in the study. Location of Infarct and Outcome In our study, inferior wall infarcts had higher rate of successful thrombolysis compared to anterior infarcts and the difference was statistically significant (P<0.05).

Similar observations were made by “C.Michael Gibson, Sabina Murphy and E. Brawnwald et al (TIMI study group)”. They found that TIMI grade III flow rates were lower for left coronary and circumflex artery compared to right coronary artery after thrombolytic therapy.

Influence of Killip classification at the time of presentation on thrombolysis :

In our study, of the 102 patients thrombolysed, 79 patients presented in KC I and 23 in KC II . The success and failure rate of thrombolysis in those who presented with KC I were found to be 70.9% and 29.1% respectively and the success and failure rate of thrombolysis in those who presented with KC II were found to be 60.9% and 39.1% respectively. No patients presented in KCIII and KC IV presentations. On statistical analysis, there was no

significant relationship between Killip classification at the time of presentation and result of thrombolysis using Inj.Streptokinase (p = 0.362).

A similar study “Original research Factors influencing the outcome of thrombolysis in acute myocardial infarction “was done by DrGirishRonad et al at, Department of General Medicine, ESIC Medical College, Gulbarga from October 2011 to October 2013. A total of 100 patients were included in the study. The major finding of this study is that the time window period, location of infarct and haemodynamic (killips) class significantly affected the outcome of thrombolysis. For Killip classification, the p value was found to be < 0.05 (statistical significance), with success rate highest for those who presented in KC I and failure rate highest for those who presented in KC IV.

PART - B

Influence of age on thrombolysis (presentation< 3 hours) :

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain , 11 were < 40 years of age, 23 were between 40 to 60 years of age and 9 were > 60 years of age. The success and failure rate of thrombolysis in those who presented within 3 hours and those who were < 40 years of age were found to be 81.8% and 18.2% respectively, those between 40 to 60 years were found to be 91.3% and 8.7% respectively and, those who presented with age > 60 years were found to be 66.7% and 33.3% respectively. The success rate was found to be higher for those with age less than 60 years than with age more than 60 years. On statistical analysis, there was no significant relationship between age and result of thrombolysis using Inj.Streptokinase in those who presented in less than 3 hours (p = 0.232).

Influence of sex on thrombolysis(presentation< 3 hours) :

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 33 were male and 10 were female. The success rate of thrombolysis in males and females and those who presented within 3 hours were found to be 81.8% and 90% respectively and failure rate of thrombolysis in males and females and those who presented within 3 hours were found to be 18.2% and 10% respectively. On statistical analysis, there was no significant relationship between sex and result of thrombolysis using Inj.Streptokinase in those who presented in less than 3 hours (p = 0.476)

Influence of lifestyle on thrombolysis(presentation< 3 hours):

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 14 were leading a sedentary lifestyle and 29 were active or leading a non-sedentary lifestyle. The success rate of thrombolysis in those leading a sedentary and non-sedentary lifestyle and those who presented within 3 hours were found to be 85.7% and 82.2% respectively and the failure rate of thrombolysis in those leading a sedentary and non-sedentary lifestyle and those who presented within 3 hours were found to be 14.3% and 17.2% respectively. On statistical analysis ,there was no significant relationship between lifestyle and result of thrombolysis using Inj.Streptokinase in those who presented in less than 3 hours ($p = 0.590$).

Influence of smoking on thrombolysis(presentation< 3 hours):

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 15 were smokers and 28 were non-smokers. The success rate of thrombolysis in smokers and non-smokers and those who presented within 3 hours were found to be 98.3% and 78.6% and failure rate of thrombolysis in smokers and non-smokers and those who presented within 3 hours were found to be 6.7% and 21.4% respectively. The success rate was found to be a bit higher in smokers than in non-smokers .On statistical analysis ,there was no significant relationship between smoking and result of thrombolysis using Inj.Streptokinase in those who presented in less than 3 hours ($p = 0.212$)

Influence of systemic hypertension on thrombolysis(presentation< 3 hours):

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 7 were hypertensives and on medications and 36 were non-hypertensives. The success rate of thrombolysis in hypertensives and non-hypertensives and those who presented within 3 hours were found to be 71.4% and 86.1% respectively and failure rate of thrombolysis in hypertensives and non-hypertensives and those who presented within 3 hours were found to be 28.6% and 13.9% respectively. On statistical analysis, there was no significant relationship between systemic hypertension and result of thrombolysis using Inj.Streptokinase in those who presented in less than 3 hours ($p = 0.318$).

Influence of diabetes on thrombolysis(presentation< 3 hours):

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 12 were diabetic and 31 were non-diabetics. The success rate of thrombolysis in diabetics and non-diabetics and those who presented within 3 hours were found to be 66.7% and 90.3% respectively and failure rate of thrombolysis in diabetics and non-diabetics and those who presented within 3 hours were found to be 33.3% and 9.7% respectively. The success rate was found to be a higher in non-diabetics than in diabetics .On statistical analysis ,there was no significant relationship between diabetes and result of thrombolysis using Inj.Streptokinase in those who presented in less than 3 hours ($p = 0.081$).

Influence of localization of thrombus in coronary artery on thrombolysis (presentation< 3 hours):

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 13 had thrombus in proximal LAD, 10 in between S1 and D1 branches of LAD, 12 in proximal RCA, 6 in distal RCA, 1 in LCX and 1 had Triple vessel disease. The success rate and failure rate of thrombolysis in those who had occlusion in proximal LAD and those who presented within 3 hours were found to be 76.9% and 23.1% respectively, in those who had occlusion in between S1 and D1 branches of LAD were found to be 60% and 40% respectively, in those who had occlusion in proximal RCA were found to be 100% and 0% respectively and in those who had occlusion in distal RCA were found to be 100% and 0% respectively. The success rate was found to be a higher in those who had thrombus occlusion in right coronary artery and presented as inferior wall myocardial infarction than in those who presented as anterior wall myocardial infarction with LAD lesion. On statistical analysis, there was significant relationship between localization of thrombus in coronary artery and result of thrombolysis using Inj.Streptokinase in those who presented in less than 3 hours ($p = 0.05$).

Influence of Killip classification at the time of presentation on thrombolysis(presentation< 3 hours) :

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 36 presented in KC I and 7 presented in KC II. The success rate of thrombolysis in KC I and KCII and those who presented within 3 hours were found to be 80.6% and 100% respectively and

failure rate of thrombolysis in KC I and KCII and those who presented within 3 hours were found to be 19.4% and 0% respectively. On statistical analysis, there was no significant relationship between Killip classification and result of thrombolysis using Inj.Streptokinase in those who presented in less than 3 hours ($p = 0.259$).

PART - C

Other important findings from the study:

Influence of sex on thrombolysis(presentation> 6 hours) :

In our study, of the 22 patients thrombolysed who presented more than 6 hours of the onset of chest pain (< 12 hours), 14 were male and 8 were female . The success rate of thrombolysis in male and female and those who presented more than 6 hours after the onset of symptoms (< 12 hours) were found to be 28.6% and 75% respectively and failure rate of thrombolysis in male and female and those who presented more than 6 hours after the onset of symptoms (< 12 hours) were found to be 71.4% and 25% respectively. The success rate was found to be higher in females than in males in those who presented more than 6 hours of the onset of symptoms. On statistical analysis, there was significant relationship between sex and result of thrombolysis using Inj.Streptokinase in those who presented more than 6 hours of the onset of symptoms ($p < 0.05$).

Influence of localization of thrombus in coronary artery on thrombolysis (presentation> 6 hours):

In our study, of the 22 patients thrombolysed who presented more than 6 hours of the onset of chest pain (< 12 hours), 8 had thrombus in proximal LAD, 5 in between S1 and D1 branches of LAD, 7 in proximal RCA, 1 in distal RCA and 1 had Triple vessel disease. The success rate and failure rate of thrombolysis in those who had occlusion in proximal LAD and those who presented more than 6 hours were found to be 25% and 75% respectively, in

those who had occlusion in between S1 and D1 branches of LAD were found to be 20% and 80% respectively, in those who had occlusion in proximal RCA were found to be 85.7% and 14.3% respectively and in those who had occlusion in distal RCA were found to be 100% and 0% respectively. The success rate was found to be a higher in those who had thrombus occlusion in right coronary artery and presented as inferior wall myocardial infarction than in those who presented as anterior wall myocardial infarction with LAD lesion .On statistical analysis, there was significant relationship between localization of thrombus in coronary artery and result of thrombolysis using Inj.Streptokinase in those who presented more than 6 hours of the onset of symptoms ($P = 0.05$) .

CONCLUSION

1. Inferior wall myocardial infarctions had a better success rate than anterior wall myocardial infarctions and it was statistically significant. But there was no significant difference on the influence of site within the RCA or the LAD on the success of thrombolysis.

2. Time window period significantly influenced the outcome of thrombolysis, implying that earlier the presentation , better is the success rate. Success rate was higher in those who presented in less than 3 hours.

3. Smokers had a higher success rate than non smokers, but it did not reach statistical significance.

4. Age-wise success rate was found to be higher in those less than 60 years of age than those of more than 60 years. But it was not statistically significant.

5. Gender was not found to influence the success rate of thrombolysis. But in presentation >6 hours, who underwent thrombolysis with Inj.Streptokinase, success rate was found to be higher in females than in males with statistical significance .

6. Lifestyle was not found to influence the result of thrombolysis.

7. Presence or absence of systemic hypertension at the time of presentation for thrombolysis had no influence on the success or failure.

8. Diabetics do not differ from non diabetics with respect to the success rate of thrombolysis. But in those who presented in less than 3 hours with symptoms , the success rate was higher in non-diabetics than in diabetics , though it was statistically insignificant.

9. Killip classification at the time of presentation was not found to influence the success rate of thrombolysis.

LIMITATIONS OF THE STUDY:

1. Smaller sample size.
2. Cross sectional study design.
3. Chances of confounding bias are more.
4. No coronary angiogram to confirm the localization of thrombus in the coronary arteries, which is based on ECG features alone in this study.

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Sl no	Name	Age	Sex	Window	Lifestyle	Smoking	Diabetes	Sht	Type	Anatomy	Killip class	Result
1	Gnanam	40	m	4 hrs	NS	no	no	no	AWMI	prox LAD	KC I	failure
2	Lakshmi	60	f	5 hrs	S	no	no	no	AWMI	prox LAD	KC I	success
3	Neelagandan	50	m	6 hrs	S	20 yrs	no	no	IWMI	prox RCA	KC I	success
4	Murali	40	m	7 hrs	S	20 yrs	no	no	AWMI	prox to D1 , distal t S1	KC II	failure
5	Sekar	47	m	5 hrs	NS	15 yrs	no	no	AWMI	prox to D1 , distal t S1	KC I	partially success
6	Noorallah	51	m	3 hrs	NS	no	no	no	AWMI	prox LAD	KC II	success
7	Paramasivam	50	m	4 hrs	S	15 yrs	no	no	IWMI	prox RCA	KC I	partially success
8	Dass	62	m	5 hrs	NS	no	no	no	AWMI	prox LAD	KC I	success
9	Murthy	65	m	3 hrs	S	no	no	no	IWMI	distal RCA	KC II	success
10	Jayavel	45	m	6 hrs	S	20 yrs	no	no	AWMI	prox LAD	KC I	failure
11	Adhikesavan	50	m	4 hrs	NS	20 yrs	5 yrs	no	AWMI	prox LAD	KC I	failure
12	Kamalakannan	35	m	7 hrs	S	15 yrs	no	no	AWMI	prox LAD	KC II	failure
13	Shankar	35	m	9 hrs	NS	15 yrs	no	no	AWMI	prox to D1, distal t S1	KC II	failure
14	Lakshmi	55	f	10 hrs	S	no	4 yrs	4 yrs	IWMI	prox RCA	KC I	failure
15	Sekar	49	m	5 hrs	NS	no	7 yrs	4 yrs	IWMI	prox RCA	KC I	success
16	Premkumar	38	m	4 hrs	NS	15 yrs	no	no	IWMI	prox RCA	KC I	success
17	Sampath	44	m	8 hrs	NS	20 yrs	no	no	IWMI	prox RCA	KC I	success
18	Nagammal	70	f	6 hrs	S	no	no	no	AWMI	prx LAD	KC II	failure

Sl no	Name	Age	Sex	Window	Lifestyle	Smoking	Diabetes	Sht	Type	Anatomy	Killip class	Result
19	Perumal	70	m	4 hrs	S	no	10 yrs	10 yrs	AWMI	prox LAD	KC II	failure
20	Krishnan	23	m	3 hrs	NS	no	no	no	AWMI	prox LAD	KC I	failure
21	Raman	45	m	5 hrs	NS	25 yrs	no	no	AWMI	prox to D1 , distal t S1	KC II	success
22	Perumal	52	m	4 hrs	S	25 yrs	no	no	AWMI	prox LAD	KC I	success
23	Radha	78	f	7 hrs	S	no	2 yrs	no	IWMI	prox RCA	KC I	success
24	Sivaganam	66	m	4 hrs	NS	no	no	2 yrs	AWMI	prox LAD	KC II	success
25	Govindhan	55	m	5 hrs	NS	15 yrs	no	no	AWMI	distal t D1 & S 1	KC I	success
26	Esther	66	m	2 hrs	NS	20 yrs	no	no	AWMI	prox to D1 , distal t S1	KC II	success
27	Aasaiyammal	65	f	7 hrs	S	no	no	1 month	AWMI	prox LAD	KC I	success
28	Hyat Basha	60	m	1 hr	S	no	no	no	LWMI	prox LCX	KC I	success
29	Godhandan	53	m	3 hrs	NS	20 yrs	no	no	AWMI	prox LAD	KC II	success
30	Dhanalakshmi	47	f	3 hrs	S	no	5 yrs	no	IWMI	prox RCA	KC I	success
31	Devi	26	f	3 hrs	S	no	no	no	AWMI	prox LAD	KC I	success
32	Vishwanathan	75	m	1 hr	NS	no	no	recent	IWMI	prox RCA	KC I	success

Sl no	Name	Age	Sex	Window	Lifestyle	Smoking	Diabetes	Sht	Type	Anatomy	Killip class	Result
33	Mary	45	f	8 hrs	S	no	no	no	AWMI	prox to D1, distal t S1	KC II	success
34	Kasiyammal	65	f	8 hrs	S	no	5 yrs	no	IWMI	prox RCA	KC I	success
35	Munusamy	53	m	3 hrs	NS	no	5 yrs	no	IWMI	prox RCA	KC I	success
36	Pandiyan	57	m	2 hrs	NS	no	no	no	AWMI	prox LAD	KC I	success
37	Valliyammal	57	f	7 hrs	S	no	5 yrs	5 yrs	AWMI	prox LAD	KC II	partially success
38	Sundar	53	m	2 hrs	NS	20 yrs	no	no	AWMI	prox to D1, distal t S1	KC I	success
39	Vedhagiri	60	m	4 hrs	S	no	no	no	AWMI	prox LAD	KC I	success
40	Sadhadullah	58	m	12 hrs	NS	15 yrs	no	5 yrs	AWMI	prox LAD	KC I	failure
41	Lakshmi	45	f	3 hrs	S	no	no	no	IWMI	distal RCA	KC I	success
42	Arputharaj	39	m	1 hr	NS	no	2 months	2 months	AWMI	prox to D1 , distal t S1	KC I	success
43	Narayanasamy	70	m	2 hrs	S	no	no	5 yrs	IWMI	distal RCA	KC I	success
44	Nagalingam	48	m	3 hrs	NS	no	2 yrs	2 yrs	AWMI	prox to D1, distal t S1	KC I	failure
45	Gowri	60	f	5 hrs	S	no	no	no	AWMI	prox LAD	KC I	failure
46	Selvaraj	50	m	6 hrs	NS	20 yrs	no	no	IWMI	prox RCA	KC I	partially success

Sl no	Name	Age	Sex	Window	Lifestyle	Smoking	Diabetes	Sht	Type	Anatomy	Killip class	Result
47	Srinivasan	65	m	4 hrs	S	20 yrs	no	no	AWMI	prox to D1, distal t S1	KC II	success
48	Deivasigamani	55	f	7 hrs	S	no	7 yrs	no	AWMI	prox LAD	KC II	success
49	Unnamalai	65	f	3 hrs	S	no	no	no	IWMI	distal RCA	KC I	success
50	Sasikumar	38	m	21/2 hrs	NS	15 yrs	no	no	IWMI	prox RCA	KC I	success
51	Muniyammal	65	f	4 hrs	S	no	no	no	IWMI	prox RCA	KC I	success
52	Sekar	48	m	3 hrs	NS	no	no	no	AWMI	prox LAD	KC I	success
53	Kothandan	65	m	4 hrs	S	20 yrs	5 yrs	no	IWMI	distal RCA	KC I	success
54	Mari	65	m	1 hr	NS	no	4 yrs	no	AWMI	prox LAD	KC I	failure
55	Siva	35	m	2 hrs	NS	15 yrs	no	no	IWMI	prox RCA	KC I	success
56	Shankar	45	m	4 hrs	NS	15 yrs	no	no	AWMI	prox to D1 , distal t S1	KC I	success
57	Bhuvaneshwari	23	f	3 hrs	NS	no	no	no	AWMI	prox LAD	KC I	failure
58	Dhanasekar	55	m	41/2 hrs	S	no	6 yrs	no	AWMI	prox LAD	KC I	success
59	Premkumar	43	m	4 hrs	NS	20 yrs	no	no	AWMI	prox to D1 , distal t S1	KC I	success
60	Krishnan	55	m	8 hrs	NS	no	10 yrs	no	AWMI	prox LAD	KC I	failure
61	Kumar	47	m	1 hr	NS	20 yrs	no	no	AWMI	prox LAD	KC I	failure
62	Subramani	60	m	1 hr	S	30 yrs	no	no	IWMI	prox RCA	KC I	success
63	Jayaraman	45	m	21/2 hrs	NS	15 yrs	no	no	IWMI	prox RCA	KC I	success
64	Anthony	65	m	4 hrs	S	20 yrs	no	3 yrs	IWMI	prox RCA	KC I	failure
65	Kasthuri	40	f	3 hrs	S	no	no	no	AWMI	prox LAD	KC I	success

Sl no	Name	Age	Sex	Window	Lifestyle	Smoking	Diabetes	Sht	Type	Anatomy	Killip class	Result
66	Elangali	65	f	3 hrs	S	no	10 yrs	10 yrs	AWMI	prox to D1 , distal t S1	KC I	failure
67	Pitchai	47	m	3 1/2 hrs	NS	no	no	no	AWMI	prox to D1 , distal t S1	KC I	failure
68	Panchacharam	67	m	2 hrs	S	no	no	no	AWMI	prox to D1 , distal t S1	KC I	failure
69	Lakshmiammal	60	f	10 hrs	S	no	no	no	IWMI	prox RCA	KC I	success
70	Jayakumar	60	m	8 hrs	NS	no	3 yrs	8 yrs	IWMI	distal RCA	KC I	success
71	Rajagopal	58	m	2 hrs	NS	18 yrs	no	2 yrs	IWMI	distal RCA	KC I	success
72	Vishwanathan	54	m	10 hrs	NS	20 yrs	no	5 yrs	IWMI	Prox RCA	KC I	success
73	Thangaraj	55	m	2 hrs	NS	20 yrs	no	no	IWMI	prox RCA	KC I	success
74	Arulanantham	57	m	11/2 hrs	NS	10 yrs	no	no	AWMI	prox LAD	KC II	success
75	Sundaram	54	m	3 hrs	NS	no	6 months	no	AWMI	prox LAD	KC II	success
76	Govindaraj	70	m	9 hrs	S	no	no	no	AWMI	prox to D1 , distal t S1	KC II	failure
77	Varadhan	40	m	2 hrs	NS	no	10 yrs	no	AWMI	prox to D1 , distal t S1	KC I	failure
78	Raji	70	f	6 hrs	S	no	no	no	AWMI	prox to D1 , distal t S1	KC I	failure
79	Rahmanabullah	76	m	2 hrs	S	no	no	no	IWMI	prox RCA	KC I	success

Sl no	Name	Age	Sex	Window	Lifestyle	Smoking	Diabetes	Sht	Type	Anatomy	Killip class	Result
80	Chinnadurai	55	m	3 hrs	NS	15 yrs	no	no	AWMI	prox to D1 , distal t S1	KC I	success
81	Venkatraman	52	m	1 hr	NS	no	6 yrs	no	AWMI	prox to D1 , distal t S1	KC I	success
82	Pandian	61	m	7 hrs	S	no	3 yrs	3 yrs	AWMI	prox LAD	KC I	failure
83	Govindhammal	48	f	11 hrs	S	no	5 yrs	no	AW & IWMI	Triple vessel disease	KC II	failure
84	Eswari	65	f	3 hrs	S	no	10 yrs	10 yrs	IWMI	prox RCA	KC I	success
85	Vijayaraghavan	45	m	7 hrs	NS	25 yrs	no	no	AWMI	prox LAD	KC I	failure
86	Munusamy	63	m	5 hrs	S	no	7 yrs	2 yrs	IWMI	prox RCA	KC I	success
87	Vinodhkumar	55	m	4 hrs	NS	20 yrs	8 months	no	AWMI	prox LAD	KC II	failure
88	Ramasamy	67	m	31/2 hrs	S	no	no	no	AWMI	prox LAD	KC I	failure
89	Sudhakar	35	m	1/2 hr	NS	10 yrs	no	no	IWMI	prox RCA	KC I	success
90	Sekar	55	m	10 hrs	NS	no	no	7 yrs	AWMI	prox LAD	KC I	failure
91	Pazhiniammal	62	f	4 hrs	S	no	10 yrs	no	IWMI	distal RCA	KC I	failure
92	Muthu	32	m	4 hrs	NS	15 yrs	no	no	AWMI	prox LAD	KC II	partially success
93	Ravi	45	m	31/2 hrs	NS	15 yrs	1 yr	no	LWMI	LCX	KC I	success
94	Perumal	40	m	21/2 hrs	NS	15 yrs	no	no	AWMI	prox LAD	KC I	success

Sl no	Name	Age	Sex	Window	Lifestyle	Smoking	Diabetes	Sht	Type	Anatomy	Killip class	Result
95	Krishnapa	55	m	41/2 hrs	NS	30 yrs	no	no	IWMI	prox RCA	KC I	partially success
96	Malliga	60	f	21/2 hrs	S	no	4 yrs	no	IWMI	distal RCA	KC I	success
97	Balaraman	73	m	10 hrs	S	40 yrs	no	no	AWMI	prox to D1, distal t S1	KC I	failure
98	Ramasamy	65	m	41/2 hrs	S	25 yrs	no	no	AWMI	prox LAD	KC II	failure
99	Vinayagamurthy	32	m	2 hrs	NS	10 yrs	no	no	AW & IWMI	Triple vessel disease	KC II	success
100	Shanmugam	35	m	31/2 hrs	NS	5 yrs	no	no	AWMI	prox LAD	KC I	success
101	Aarifa	45	f	1 hr	NS	no	5 yrs	no	IWMI	prox RCA	KC I	success
102	Veerabadhran	55	m	11/2 hrs	NS	no	no	no	AWMI	prox LAD	KC I	success